Dell PowerEdge T110 II Systems

Owner's Manual

Regulatory Model E11S Series
Regulatory Type E11S002

Notes, Cautions, and Warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates potential damage to hardware or loss of data if instructions are not followed.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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1

About Your System

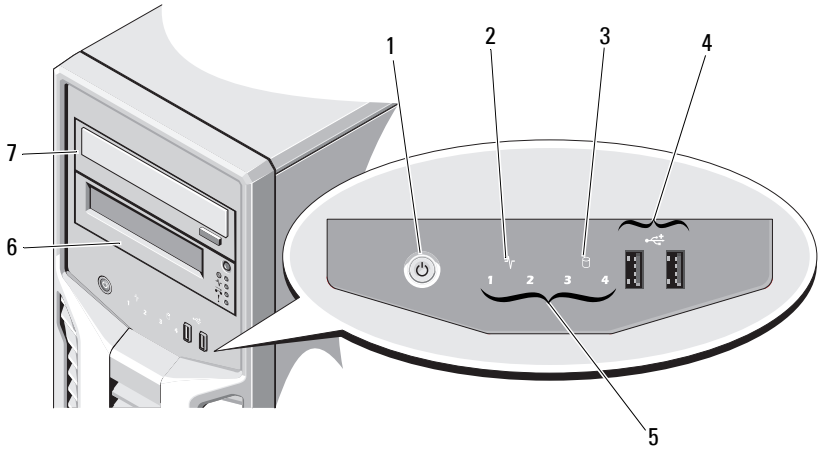
Accessing System Features During Startup

The following keystrokes provide access to system features during startup:

Keystroke	Description
<F2>	Enters the System Setup program. See "Using the System Setup Program and Boot Manager" on page 23.
<F10>	Enters System Services, which opens the Dell Unified Server Configurator (USC). The Dell USC allows you to access utilities such as embedded system diagnostics. For more information, see the Dell USC documentation.
<F11>	Enters the BIOS Boot Manager or the Unified Extensible Firmware Interface (UEFI) Boot Manager, depending on the system's boot configuration. See "Using the System Setup Program and Boot Manager" on page 23.
<F12>	Starts Preboot eXecution Environment (PXE) boot.
<Ctrl><E>	Enters the Baseboard Management Controller (BMC) Configuration Utility, which allows access to the System Event Log (SEL) and configuration of remote access to the system. For more information, see the BMC user documentation.
<Ctrl><C>	Enters the SAS Configuration Utility. For more information, see the SAS adapter documentation.
<Ctrl><R>	Enters the PERC configuration utility. For more information, see the PERC card documentation.
<Ctrl><S>	Enters the utility to configure NIC settings for PXE boot. For more information, see the documentation for your integrated NIC.

Front-Panel Features and Indicators

Figure 1-1. Front-Panel Features and Indicators

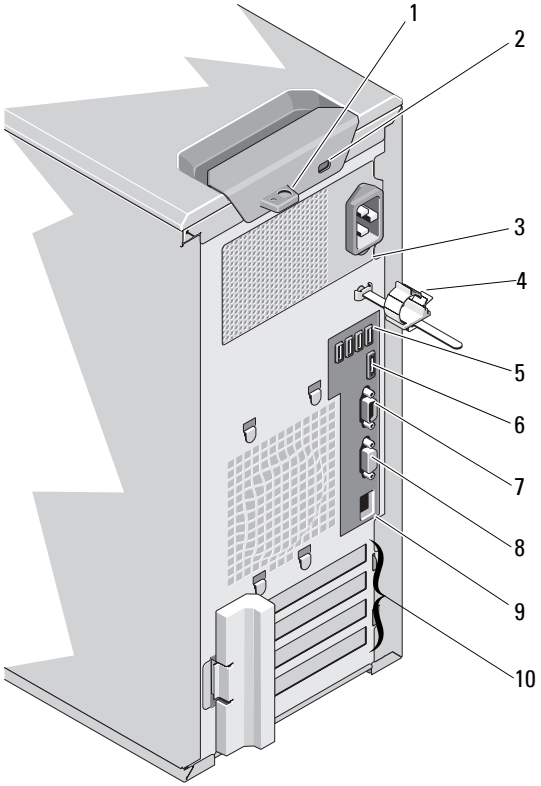


Item	Indicator, Button, or Connector	Icon	Description
1	Power-on indicator, power button	⏻	The power-on indicator lights when the system power is on. The power button controls the DC power supply output to the system. **NOTE:** When powering on the system, the video monitor can take from several seconds to over 2 minutes to display an image, depending on the amount of memory installed in the system. **NOTE:** On ACPI-compliant operating systems, turning off the system using the power button causes the system to perform a graceful shutdown before power to the system is turned off.

Item	Indicator, Button, or Connector	Icon	Description
2	System health indicator		The system health indicator blinks amber when a system fault is detected.
3	Hard-drive activity indicator		The hard drive activity indicator lights up when the hard drive is in use.
4	USB connectors (2)		Connect USB devices to the system. The ports are USB 2.0-compliant.
5	Diagnostic indicator lights (4)		The four diagnostic indicator lights display error codes during system startup. See "Diagnostic Lights" on page 15.
6	Tape drive (optional)		One optional half-height (using one drive bay).
7	Optical drive (optional)		One optional SATA DVD-ROM drive or DVD+/-RW drive. **NOTE:** DVD devices are data only.

Back-Panel Features and Indicators

Figure 1-2. Back-Panel Features and Indicators



Item	Indicator, Button, or Connector	Icon	Description
1	Padlock ring		Locks the cover release latch.
2	Security cable slot		Connects a cable lock to the system.
3	Power supply		305 W power supply.
4	Cable clasp		Secures the power cable.

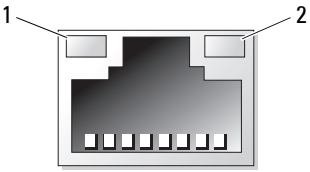
Item	Indicator, Button, or Connector	Icon	Description
5	USB connectors (4)		Connect USB devices to the system. The ports are USB 2.0-compliant.
6	eSATA connector	eSATA	Connects additional storage devices.
7	Serial connector		Connects a serial device to the system.
8	Video connector		Connects a VGA display to the system.
9	Ethernet connector		Integrated 10/100/1000 NIC connector.
10	PCIe expansion card slots (4)		Connects up to four PCI Express expansion cards.

Guidelines for Connecting External Devices

- Turn off power to the system and external devices before attaching a new external device. Turn on any external devices before turning on the system (unless the documentation for the device specifies otherwise).
- Ensure that the appropriate driver for the attached device has been installed on the system.
- If necessary to enable ports on your system, use the System Setup program. See "Using the System Setup Program and Boot Manager" on page 23.

NIC Indicator Codes

Figure 1-3. NIC Indicator Codes



1 link indicator 2 activity indicator

Indicator	Indicator Code
Link and activity indicators are off	The NIC is not connected to the network.
Link indicator is green	The NIC is connected to a valid network link at 1000 Mbps.
Link indicator is amber	The NIC is connected to a valid network link at 10/100 Mbps.
Activity indicator is green blinking	Network data is being sent or received.

Diagnostic Lights

The four diagnostic indicator lights on the system front panel display error codes during system startup. Table 1-1 lists the causes and possible corrective actions associated with these codes. A highlighted circle indicates the light is on; a non-highlighted circle indicates the light is off.

Table 1-1. Diagnostic Indicator Code

Code	Causes	Corrective Action
	The system is in a normal off condition or a possible pre-BIOS failure has occurred.	Plug the system into a working electrical outlet and press the power button.
	The diagnostic lights are not lit after the system successfully boots to the operating system.	
	The system is in a normal operating condition after POST.	Information only.
	BIOS checksum failure detected; system is in recovery mode.	See "Getting Help" on page 123.
	Possible processor failure.	See "Troubleshooting the Processor" on page 113.
	Memory failure.	See "Troubleshooting System Memory" on page 107.
	Possible expansion card failure.	See "Troubleshooting Expansion Cards" on page 112.
	Possible video failure.	See "Getting Help" on page 123.

Code	Causes	Corrective Action
	Hard drive failure.	Ensure that the hard drives are properly connected. See "Hard Drives" on page 56 for information on the drives installed in your system.
	Possible USB failure.	See "Troubleshooting a USB Device" on page 100.
	No memory modules detected.	See "Troubleshooting System Memory" on page 107.
	System board failure.	See "Getting Help" on page 123.
	Memory configuration error.	See "Troubleshooting System Memory" on page 107.
	Possible system board resource and/or system board hardware failure.	See "Getting Help" on page 123.
	Possible system resource configuration error.	See "Getting Help" on page 123.
	Other failure.	Ensure that the optical drive and hard drives are properly connected. See "Troubleshooting Your System" on page 99 for the appropriate drive installed in your system. If the problem persists, see "Getting Help" on page 123.

System Messages

System messages appear on the screen to notify you of a possible problem with the system.

NOTE: If you receive a system message not listed in the table, check the documentation for the application that is running when the message appears or the operating system's documentation for an explanation of the message and recommended action.

Message	Causes	Corrective Actions
`BIOS MANUFACTURING MODE detected. MANUFACTURING MODE will be cleared before the next boot. System reboot required for normal operation.`	System is in manufacturing mode.	Reboot to take the system out of manufacturing mode.
`Caution! NVRAM_CLR jumper is installed on system board. Please run SETUP.`	NVRAM_CLR jumper is installed in the clear setting. CMOS has been cleared.	Move the NVRAM_CLR jumper to the default position (pins 3 and 5). See Figure 6-1 for jumper location. Restart the system and re-enter the BIOS settings. See "Using the System Setup Program and Boot Manager" on page 23.
`Invalid configuration information - please run SETUP program.`	An invalid system configuration caused a system halt.	Run the System Setup program and review the current settings. See "Using the System Setup Program and Boot Manager" on page 23.
`Keyboard controller failure.`	Faulty keyboard controller; faulty system board.	See "Getting Help" on page 123.

Message	Causes	Corrective Actions
Keyboard data line failure. Keyboard stuck key failure.	Keyboard cable connector is improperly connected or the keyboard is defective.	Reseat the keyboard cable. If the problem persists, see "Troubleshooting a USB Device" on page 100.
Manufacturing mode detected.	System is in manufacturing mode.	Reboot to take the system out of manufacturing mode.
Memory Initialization Warning: Memory size may be reduced.	Invalid memory configuration. The system will run but with less memory than is physically available.	Ensure that the memory modules are installed in a valid configuration. See "General Memory Module Installation Guidelines" on page 73.
No boot device available.	Faulty or missing optical drive subsystem, hard drive, or hard-drive subsystem, or no bootable USB key installed.	Use a bootable USB key, CD, or hard drive. If the problem persists, see "Troubleshooting a USB Device" on page 100, "Troubleshooting an Optical Drive" on page 109, and "Troubleshooting a Hard Drive" on page 111. See "Using the System Setup Program and Boot Manager" on page 23 for information on setting the order of boot devices.
PCI BIOS failed to install.	PCIe device BIOS (Option ROM) checksum failure detected during shadowing. Cables to expansion card loose; faulty or improperly installed expansion card.	Reseat the expansion card. Ensure that all appropriate cables are securely connected to the expansion card. If the problem persists, see "Troubleshooting Expansion Cards" on page 112.

Message	Causes	Corrective Actions
PCIe Training Error: Expected Link Width is *x*, Actual Link Width is *y*.	Faulty or improperly installed PCIe card in the specified slot.	Reseat the PCIe card in the specified slot number. See "Troubleshooting Expansion Cards" on page 112. If the problem persists, see "Getting Help" on page 123.
SATA Port*x* device not found.	There is no device connected to the specified SATA port.	Information only.
SATA port *x* device auto-sensing error. SATA port *x* device configuration error. SATA port *x* device error.	The drive connected to the specified SATA port is faulty.	Replace the faulty drive.
The amount of system memory has changed.	Memory has been added or removed or a memory module may be faulty.	If memory has been added or removed, this message is informative and can be ignored. If memory has not been added or removed, check the SEL to determine if single-bit or multi-bit errors were detected and replace the faulty memory module. See "Troubleshooting System Memory" on page 107.
Time-of-day not set - please run SETUP program.	Incorrect Time or Date settings; faulty system battery.	Check the Time and Date settings. See "Using the System Setup Program and Boot Manager" on page 23. If the problem persists, replace the system battery. See "System Memory" on page 73.

Message	Causes	Corrective Actions
`Timer chip counter 2 failed.`	Faulty system board.	See "Getting Help" on page 123.
`TPM failure.`	A TPM function has failed.	See "Getting Help" on page 123.
`Warning! No micro code update loaded for processor n.`	Micro code update failed.	Update the BIOS firmware. See "Getting Help" on page 123.

NOTE: For the full name of an abbreviation or acronym used in this table, see the *Glossary* on **support.dell.com/manuals**.

Warning Messages

A warning message alerts you to a possible problem and prompts you to respond before the system continues a task. For example, before you format a hard drive, a message warns you that you may lose all data on the hard drive. Warning messages usually interrupt the task and require you to respond by typing `y` (yes) or `n` (no).

NOTE: Warning messages are generated by either the application or the operating system. For more information, see the documentation that accompanied the operating system or application.

Diagnostics Messages

The system diagnostic utilities may issue messages if you run diagnostic tests on your system. See "Running the System Diagnostics" on page 115 for more information about system diagnostics.

Alert Messages

Systems management software generates alert messages for your system. Alert messages include information, status, warning, and failure messages for drive, temperature, fan, and power conditions. For more information, see the systems management software documentation.

Other Information You May Need

WARNING: See the safety and regulatory information that shipped with your system. Warranty information may be included within this document or as a separate document.

- The *Getting Started Guide* provides an overview of system features, setting up your system, and technical specifications.
- Any media that ships with your system that provides documentation and tools for configuring and managing your system, including those pertaining to the operating system, system management software, system updates, and system components that you purchased with your system.

NOTE: Always check for updates on **support.dell.com/manuals** and read the updates first because they often supersede information in other documents.

2

Using the System Setup Program and Boot Manager

The System Setup program is the BIOS program that enables you to manage your system hardware and specify BIOS-level options. From the System Setup program, you can:

- Change the NVRAM settings after you add or remove hardware
- View the system hardware configuration
- Enable or disable integrated devices
- Set performance and power management thresholds
- Manage system security

Choosing the System Boot Mode

The System Setup program also enables you to specify the boot mode for installing your operating system:

- BIOS boot mode (the default) is the standard BIOS-level boot interface.
- UEFI boot mode is an enhanced 64-bit boot interface based on Unified Extensible Firmware Interface (UEFI) specifications that overlays the system BIOS. See "Entering the UEFI Boot Manager" on page 35 for more information on this interface.

You must select the boot mode in the **Boot Mode** field of the "Boot Settings Screen" on page 29 of the System Setup program. Once you specify the boot mode, the system boots in the specified boot mode and you proceed then to install your operating system from that mode. Thereafter, you must boot the system to the same boot mode (BIOS or UEFI) to access the installed operating system. Trying to boot the operating system from the other boot mode will cause the system to halt immediately at startup.

NOTE: Operating systems must be UEFI-compatible (for example, Microsoft Windows Server 2008 x64 version) to be installed from the UEFI boot mode. DOS and 32-bit operating systems do not support UEFI and can only be installed from the BIOS boot mode.

Entering the System Setup Program

1. Turn on or restart your system.
2. Press <F2> immediately after you see the following message:

   ```
   <F2> = System Setup
   ```

   If your operating system begins to load before you press <F2>, allow the system to finish booting, and then restart your system and try again.

Responding to Error Messages

If an error message appears while the system is booting, make a note of the message. See "System Messages" on page 17 for an explanation of the message and suggestions for correcting errors.

NOTE: After installing a memory upgrade, it is normal for your system to display a message the first time you start your system.

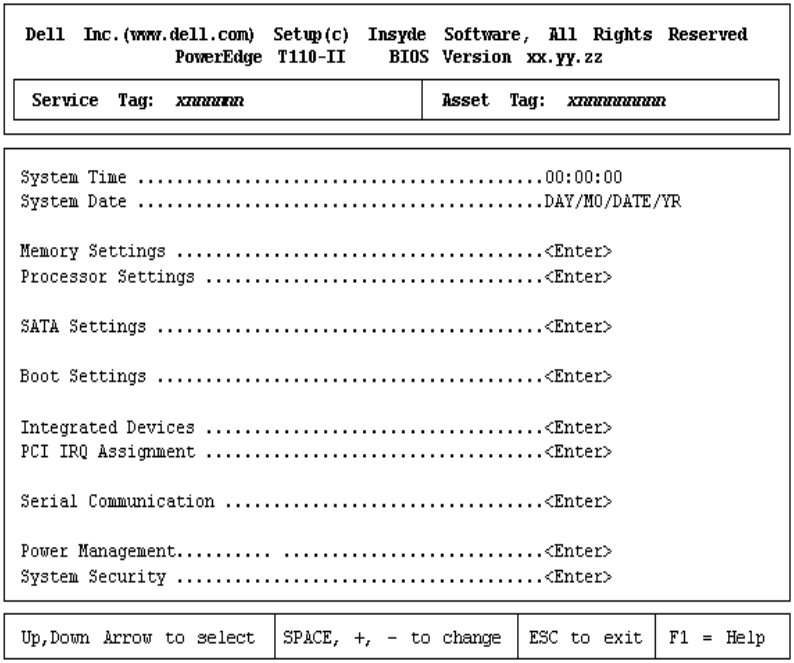
Using the System Setup Program Navigation Keys

Keys	Action
Up arrow	Moves to the previous field.
Down arrow or <Tab>	Moves to the next field.
<Enter>, Spacebar, <+>, or <–>	Cycles through the settings in a field. In many fields, you can also type the appropriate value.
<Esc>	Exits the System Setup program and restarts the system if any changes were made.
<F1>	Displays the System Setup program's help file.

NOTE: For most of the options, any changes that you make are recorded but do not take effect until you restart the system.

System Setup Options

Main Screen



NOTE: The options for the System Setup program change based on the system configuration.

NOTE: The System Setup program defaults are listed under their respective options in the following sections, where applicable.

Option	Description
System Time	Sets the time on the system's internal clock.
System Date	Sets the date on the system's internal calendar.
Memory Settings	Displays information related to installed memory. See "Memory Settings Screen" on page 27.

Option	Description
Processor Settings	Displays information related to the processor (speed, cache size, and so on). See "Processor Settings Screen" on page 27.
SATA Settings	Displays a screen to enable or disable the integrated SATA controller and ports. See "SATA Settings Screen" on page 28.
Boot Settings	Displays a screen to specify the boot mode (BIOS or UEFI). For BIOS boot mode, you can also specify the boot devices. See "Boot Settings Screen" on page 29.
Integrated Devices	Displays a screen to enable or disable integrated device controllers and ports, and to specify related features and options. See "Integrated Devices Screen" on page 29.
PCI IRQ Assignment	Displays a screen to change the IRQ assigned to each of the integrated devices on the PCI bus, and any installed expansion card that requires an IRQ. See "PCI IRQ Assignments Screen" on page 30.
Serial Communication	Displays a screen to enable or disable the serial ports and specify related features and options. See "Serial Communication Screen" on page 31.
Power Management	Enables you to manage power usage of the processor, fans, and memory modules with preconfigured or customized settings. See "Power Management Screen" on page 32.
System Security	Displays a screen to configure the system password and setup password features. See "System Security Screen" on page 33, "Using the System Password" on page 38, and "Using the Setup Password" on page 40 for more information.
Keyboard NumLock (**On** default)	Determines whether your system starts up with the NumLock mode activated on 101- or 102-key keyboards (does not apply to 84-key keyboards).

Option	Description
Report Keyboard Errors (**Report** default)	Enables or disables reporting of keyboard errors during the POST. Select **Report** for host systems that have keyboards attached. Select **Do Not Report** to suppress all error messages relating to the keyboard or keyboard controller during POST. This setting does not affect the operation of the keyboard itself if a keyboard is attached to the system.
F1/F2 Prompt on Error (**Enabled** default)	Enables the system to halt on errors during POST, which allows the user to observe events that may scroll by unnoticed during normal POST. The user can press <F1> to continue or <F2> to enter the System Setup program. **CAUTION: When setting this option to Disabled, the system does not halt if an error occurs during POST. Any critical errors are displayed and logged in the system event log.**

Memory Settings Screen

Option	Description
System Memory Size	Displays the amount of system memory.
System Memory Type	Displays the type of system memory.
System Memory Speed	Displays the system memory speed.
Video Memory	Displays the amount of video memory.
System Memory Testing (**Enabled** default)	Specifies whether system memory tests are run at system boot. Options are **Enabled** and **Disabled**.

Processor Settings Screen

Option	Description
64-bit	Specifies if the processor supports 64-bit extensions.
Core Speed	Displays the processor clock speed.
Bus Speed	Displays the processor bus speed.

Option	Description
Processor Family-Model-Stepping	Displays the processor family and model.
Level 2 Cache	Displays the level 2 cache size.
Level 3 Cache	Displays the level 3 cache size.
Number of Cores	Displays the number of cores of the processor.
Logical Processor (**Enabled** default)	On processors that support Simultaneous Multi-Threading (SMT) technology, each processor core supports up to two logical processors. If this field is set to **Enabled**, the BIOS reports both logical processors. If set to **Disabled**, only one logical processor is monitored by the BIOS.
Virtualization Technology (**Disabled** default)	**Enabled** permits virtualization software to use the virtualization technology incorporated in the processor. **NOTE:** Disable this feature if your system will not be running virtualization software.
Execute Disable (**Enabled** default)	Enables or disables Execute Disable Memory Protection Technology.
Number of Cores per Processor (**All** default)	If set to **All**, the maximum number of cores in each processor is enabled.
Turbo Mode (**Enabled** default)	If Turbo Boost technology is supported by the processor, enables or disables **Turbo Mode**.
C States (**Enabled** default)	When set to **Enabled**, the processor can operate in all available power states.

SATA Settings Screen

Option	Description
Embedded SATA (**AHCI** default)	Allows the embedded SATA to be set to **Off**, **ATA**, **AHCI**, or **RAID** modes.
Port A (**Auto** default)	**Auto** enables BIOS support for the device attached to SATA port A. **Off** disables BIOS support for the device.
Port B (**Off** default)	**Auto** enables BIOS support for the device attached to SATA port B. **Off** disables BIOS support for the device.

Option	Description
Port C (**Off** default)	**Auto** enables BIOS support for the device attached to SATA port C. **Off** disables BIOS support for the device.
Port D (**Off** default)	**Auto** enables BIOS support for the device attached to SATA port D. **Off** disables BIOS support for the device.
Port E (**Auto** default)	**Auto** enables BIOS support for the device attached to SATA port E. **Off** disables BIOS support for the device.
eSATA port (**Auto** default)	**Auto** enables BIOS support for the device attached to the eSATA port. **Off** disables BIOS support for the device.

Boot Settings Screen

Option	Description
Boot Mode (**BIOS** default)	**CAUTION: Switching the boot mode could prevent the system from booting if the operating system was not installed in the same boot mode.** If the operating system supports Unified Extensible Firmware Interface (UEFI), you can set this option to **UEFI**. Setting this field to **BIOS** allows compatibility with non-UEFI operating systems. **NOTE:** Setting this field to **UEFI** disables the **Boot Sequence**, **Hard-Disk Drive Sequence**, and **USB Flash Drive Emulation Type** fields.
Boot Sequence Retry (**Disabled** default)	If this field is enabled and the system has failed to boot, the system re-attempts to boot after 30 seconds.

Integrated Devices Screen

Option	Description
User Accessible USB Ports (**All Ports On** default)	Enables or disables the user-accessible USB ports. Options are **All Ports On**, **Only Back Ports On**, and **All Ports Off**.
Internal USB Port (**On** default)	Enables or disables the internal USB port.

Option	Description
Embedded NIC1 and NIC2 (**Enabled** default)	Enables or disables the operating system interface of the NIC1 and NIC2 controllers. (The NICs may also be accessed through the system's management controller).
Embedded Gb NIC1 (**Enabled with PXE** default)	PXE support allows the system to boot from the network. **Enabled with iSCSI Boot** option is available if the NIC on board supports iSCSI.
MAC Address	Displays the MAC address for the NIC.
Embedded Gb NIC2 (**Enabled** default)	PXE support allows the system to boot from the network. **Enabled with iSCSI Boot** option is available if the NIC on board supports iSCSI.
MAC Address	Displays the MAC address for the NIC.
OS Watchdog Timer (**Disabled** default)	Sets a timer to monitor the operating system for activity, and aids in recovery if the system stops responding. When **Enabled**, the operating system is allowed to initialize the timer. When **Disabled**, the timer is not initialized. **NOTE:** This feature is usable only with operating systems that support WDAT implementations of the Advanced Configuration and Power Interface (ACPI) 3.0b specification.
Embedded Video Controller (**Standard** default)	Enables or disables BIOS support for the integrated video controller. **NOTE:** This field can be disabled only if an add-in video card is present. If this field is disabled, remote access features such as virtual KVM are not available.

PCI IRQ Assignments Screen

Option	Description
<*PCIe device*>	Use the <+> and <-> keys to manually select an IRQ for a given device, or select **Default** to allow the BIOS to select an IRQ value at system startup.

Serial Communication Screen

Option	Description
Serial Communication (**On without Console Redirection** default)	Selects whether the serial communication devices (**Serial Device 1** and **Serial Device 2**) are enabled in BIOS. BIOS console redirection can also be enabled and the port address used can be specified. Options are **On without Console Redirection**, **On with Console Redirection via COM1**, **On with Console Redirection via COM2**, and **Off**.
Serial Port Address (**Serial Device 1=COM1, Serial Device2=COM2** default)	Sets the serial port addresses for the two serial devices. **NOTE:** Only Serial Device 2 can be used for Serial Over LAN (SOL). To use console redirection by SOL, configure the same port address for console redirection and the serial device.
External Serial Connector (**Serial Device1** default)	Specifies whether **Serial Device 1**, **Serial Device 2**, or **Remote Access Device** has access to the external serial connector. **NOTE:** Only Serial Device 2 can be used for SOL. To use console redirection by SOL, configure the same port address for console redirection and the serial device.
Failsafe Baud Rate (**115200** default)	Displays the failsafe baud rate used for console redirection. BIOS attempts to determine the baud rate automatically. This failsafe baud rate is used only if the attempt fails. This rate should not be adjusted.
Remote Terminal Type (**VT 100/VT220** default)	Sets the remote console terminal type, either **VT100/VT220** or **ANSI**.
Redirection After Boot (**Enabled** default)	Enables or disables BIOS console redirection when the operating system is loaded.

Power Management Screen

Option	Description
Power Management (**OS Control** default)	Options are **OS Control**, **Custom**, or **Maximum Performance**. For all but the **Custom** setting, the BIOS pre-configures the power settings on this screen as follows: • **OS Control** sets the CPU power to **OS DBPM**, the fan power to **Minimum Power**, and the memory power to **Maximum Performance**. In this setting, all processor performance information is passed from the system BIOS to the operating system for control. The operating system sets the processor performance based on processor utilization. • **Maximum Performance** sets all fields to **Maximum Performance**. If you select **Custom**, you can configure each option independently.
CPU Power and Performance Management	Options are **OS DBPM**, **Maximum Performance**, or **Minimum Power**.
Fan Power and Performance Management	Options are **Maximum Performance** or **Minimum Power**.
Memory Power and Performance Management	Options are **Maximum Performance**, a specified frequency, or **Minimum Power**.

System Security Screen

Option	Description
TPM Security (**Off** default)	Sets the reporting of the Trusted Platform Module (TPM) in the system. If **Off**, the presence of the TPM is not reported to the operating system. If **On with Pre-boot Measurements**, the system reports the TPM to the operating system and stores the pre-boot measurements to the TPM during POST. If **On without Pre-boot Measurements**, the system reports the TPM to the operating system and bypasses pre-boot measurements.
TPM Status	When set to **Disabled**, the TPM is disabled.When set to **Deactivated**, the TPM is deactivated.
TPM Activation	When set to **Activate**, the TPM is enabled to default settings. When set to **Deactivate**, the TPM is disabled. The **No Change** state initiates no action. The operational state of the TPM remains unchanged (all user settings for the TPM are preserved). **NOTE:** This field is read-only when **TPM Security** is set to **Off**.
TPM Clear	**CAUTION: Clearing the TPM will lose all encryption keys in the TPM. This option prevents booting to the operating system and results in data loss if the encryption keys cannot be restored. Back up the TPM keys prior to enabling this option.** When set to **Yes**, all TPM contents are cleared. **NOTE:** This field is read-only when **TPM Security** is set to **Off**.
System Password (**Not Enabled** default)	Displays the current status of the password security feature and allows a new system password assignment and verification. **NOTE:** See "Using the System Password" on page 38 for more information.

Option	Description
Setup Password (**Not Enabled** default)	Restricts access to the System Setup program by using a setup password. **NOTE:** For more information, see "Using the Setup Password" on page 40.
Password Status (**Unlocked** default)	When **Setup Password** is assigned and this field is **Locked**, the system password cannot be changed or disabled at system start-up. **NOTE:** For more information, see "Using the System Password" on page 38.
Set Setup Password	Allows a new setup password assignment.
Set System Password	Allows a new system password assignment.
Power Button (**Enabled** default)	If **Enabled**, the power button can turn the system's power off and on. On an ACPI-compliant operating system, the system performs an orderly shutdown before power is turned off. When **Disabled**, the button can only turn on system power.
NMI Button (**Disabled** default)	Use the NMI button only if directed to do so by qualified support personnel or by the operating system's documentation. Pressing this button halts the operating system and displays a diagnostic screen. Enables or disables the NMI feature.
AC Power Recovery (**Last** default)	Determines how the system reacts when power is restored. If set to **Last**, the system returns to the last power state. **On** turns on the system after power is restored. **Off** allows the system to remain off after power is restored.

Option	Description
AC Power Recovery Delay (**Immediate** default)	Determines how the system supports the staggering of power up after the AC power has been restored to the system. Options are: • **Immediate —** No delay for power up. • **Random** — A random delay of 45 to 240 seconds for BMC. • **User Defined** — The system delays power up based on the defined amount. The defined range is 45 to 240 seconds for BMC.

Exit Screen

Press <Esc> to exit the System Setup program; the **Exit** screen displays:

- `Saving Changes and Exit`
- `Discarding Changes and Exit`
- `Return to Setup`

Entering the UEFI Boot Manager

NOTE: Operating systems must be 64-bit UEFI-compatible (for example, Microsoft Windows Server 2008 x64 version) to be installed from the UEFI boot mode. DOS and 32-bit operating systems can only be installed from the BIOS boot mode.

NOTE: The Boot Mode must be set to **UEFI** in the System Setup program to access the Boot Manager.

The Boot Manager enables you to:

- Add, delete, and arrange boot options
- Access the System Setup program and BIOS-level boot options without rebooting

To enter the Boot Manager:

1. Turn on or restart your system.

2 Press <F11> after you see the following message:

```
<F11> = Boot Manager
```

NOTE: The system will not respond until the USB keyboard is active.

If your operating system begins to load before you press <F11>, allow the system to finish booting, and then restart your system and try again.

Using the Boot Manager Navigation Keys

Keys	Action
Up arrow	Moves to and highlights the previous field.
Down arrow	Moves to and highlights the next field.
<Enter>	Selects the field and sub-menu.
<Esc>	Refreshes the Boot Manager screen, or returns to the Boot Manager screen from the other program screens.
<F1>	Displays the Boot Manager help file.

Boot Manager Screen

Option	Description
Continue Normal Boot	The system attempts to boot to devices starting with the first item in the boot order. If the boot attempt fails, the system will continue with the next item in the boot order until the boot is successful or no more boot options are found.
Select Boot Mode	Displays the list of available boot options (marked with asterisks). Select the boot option you wish to use and press **Enter**.
Boot Settings	Enables you to add, delete, enable, or disable boot options; change boot order; or execute a one-time boot option.
System Utilities	Enables you to access the System Setup program, System Services (Dell Unified Server Configurator [USC]), Diagnostics, and BIOS-level boot options.

Boot Settings Screen

Boot Mode: BIOS

Option	Description
Set Boot Order	Sets the order of the boot option list.
Set Legacy Floppy Drive Order	Sets the floppy drive boot priority.
Set Legacy Hard Disk Drive Order	Sets the hard drive boot priority.
Set Legacy CD-ROM Drive Order	Sets the CD-ROM boot priority.
Set Legacy NET Drive Order	Sets the network device boot priority.
Set Legacy BEV Drive Order	Sets the Bootstrap Entry Vector (BEV) boot priority.

NOTE: Only the first device under Legacy Drive is displayed in the **Set Boot Order** option.

Boot Mode: UEFI

Option	Description
Add Boot Option	Adds a new boot option.
Delete Boot Option	Deletes an existing boot option.
Enable/Disable Boot Option	Disables and enables a boot option in the boot option list.
Boot From File	Sets a one-time boot option not included in the boot option list.
Set Boot Order	Sets the order of the boot option list.

System Utilities Screen

Option	Description
System Setup	Accesses the System Setup program without rebooting.
System Services	Restarts the system and accesses the Dell USC, which allows you to run utilities such as system diagnostics.
Reset System	Restarts the system.

System and Setup Password Features

NOTE: For a forgotten password, see "Disabling a Forgotten Password" on page 122.

Your system is shipped without the system password feature enabled. Operate the system only with system password protection.

CAUTION: The password features provide a basic level of security for the data on your system.

CAUTION: Anyone can access the data stored on your system if the system is running and unattended.

Using the System Password

When a system password is assigned, the system prompts for the system password after the system starts and only those with the password have full use of the system.

Assigning a System Password

Before assigning a system password, enter the System Setup program and check the **System Password** option.

When a system password is assigned, **System Password** is **Enabled**. If **Password Status** is **Unlocked**, you can change the system password. If **Locked**, you cannot change the system password. Disabling the password jumper on the system board sets **System Password** to **Disabled**, and you cannot change or enter a new system password.

When a system password is not assigned and the password jumper on the system board is in the enabled position, **System Password** is **Not Enabled** and **Password Status** is **Unlocked**.
To assign a system password:

1. Verify that **Password Status** is **Unlocked**.
2. Highlight the **System Password** option and press <Enter>.
3. Type your new system password.

   You can use up to 32 characters in your password.

   As you type, placeholders appear in the field.

The password assignment is not case-sensitive. Certain key combinations are invalid. To erase a character, press <Backspace>.

NOTE: To escape from the field without assigning a system password, press <Enter> to move to another field, or press <Esc> prior to completing step 5.

4 Press <Enter>.

5 To confirm your password, type it a second time and press <Enter>.

System Password changes to **Enabled**. Exit the System Setup program and begin using your system.

6 Either reboot the system now for the password protection to take effect or continue working.

NOTE: Password protection does not take effect until the system reboots.

Using Your System Password to Secure Your System

NOTE: If you have assigned a setup password (see "Using the Setup Password" on page 40), the system accepts your setup password as an alternate system password.

1 Turn on or reboot your system by pressing <Ctrl><Alt><Delete>.

2 Type your password and press <Enter>.

When **Password Status** is **Locked**, you must type the password and press <Enter> when prompted at reboot.

If an incorrect system password is entered, the system displays a message and prompts you to re-enter your password. You have three attempts to enter the correct password. After the third unsuccessful attempt, the system displays an error message that the system has halted and will shut down.

Even after you shut down and restart the system, the error message continues to be displayed until the correct password is entered.

NOTE: You can use the **Password Status** option in conjunction with the **System Password** and **Setup Password** options to protect your system from unauthorized changes.

Deleting or Changing an Existing System Password

1. Enter the System Setup program and select the **System Security**.
2. Highlight **Setup Password**, press <Enter> to access the setup password window. Press <Enter> twice to clear the existing setup password.
3. The setting changes to **Not Enabled**.
4. To assign a new setup password, perform the steps in "Assigning a Setup Password" on page 40.

Using the Setup Password

Assigning a Setup Password

You can assign a setup password only when the **Setup Password** is **Not Enabled**. To assign a setup password, highlight the **Setup Password** option and press the <+> or <–> key. The system prompts you to enter and verify the password.

NOTE: The setup password can be the same as the system password. If the two passwords are different, the setup password can be used as an alternate system password. The system password cannot be used in place of the setup password.

You can use up to 32 characters in your password.

As you type, placeholders appear in the field.

The password assignment is not case-sensitive. Certain key combinations are invalid. To erase a character, press <Backspace>.

When you verify the password, the **Setup Password** changes to **Enabled**. The next time you enter the System Setup program, the system prompts you for the setup password.

A change to the **Setup Password** option becomes effective immediately (restarting the system is not required).

Operating With a Setup Password Enabled

If **Setup Password** is **Enabled**, you must enter the correct setup password before modifying most of the System Setup options.

If you do not enter the correct password in three attempts, the system lets you view, but not modify, the System Setup screens. The following options are exceptions: If **System Password** is not **Enabled** and is not locked through the **Password Status** option, you can assign a system password. You cannot disable or change an existing system password.

NOTE: You can use the **Password Status** option in conjunction with the **Setup Password** option to protect the system password from unauthorized changes.

Deleting or Changing an Existing Setup Password

1. Enter the System Setup program and select the **System Security**.
2. Highlight **Setup Password**, press <Enter> to access the setup password window. Press <Enter> twice to clear the existing setup password.

   The setting changes to **Not Enabled**.
3. To assign a new setup password, perform the steps in "Assigning a Setup Password" on page 40.

Embedded System Management

The Dell USC is an embedded utility that enables systems and storage management tasks from an embedded environment throughout the server's lifecycle.

The Dell USC can be started during the boot sequence and can function independently of the operating system.

NOTE: Certain platform configurations may not support the full set of features provided by Dell USC.

The following features of Dell USC are supported on systems with Baseboard Management Controller (BMC):

- Installing an operating system
- Running diagnostics to validate the memory, I/O devices, processor, physical disks, and other peripherals

For more information about setting up Dell USC, configuring hardware and firmware, and deploying the operating system, see the Unified Server Configurator documentation at **support.dell.com/manuals**.

Baseboard Management Controller Configuration

The BMC enables configuring, monitoring, and recovery of systems remotely. The BMC provides the following features:

- Enables fault logging and SNMP alerting
- Provides access to system event log and sensor status
- Allows control of system functions including power on and off
- Functions independently of the system's power state or the system's operating system
- Provides text console redirection for system setup, text-based utilities, and operating system consoles

NOTE: To remotely access the BMC through the integrated NIC, you must connect the network connection to integrated NIC1.

For additional information on using BMC, see the documentation for the BMC and systems management applications at **support.dell.com/manuals**.

Entering the BMC Setup Module

1. Turn on or restart your system.
2. Press <Ctrl><E> when prompted after POST.

   If your operating system begins to load before you press <Ctrl><E>, allow the system to finish booting, and then restart your system and try again.

3

Installing System Components

Recommended Tools

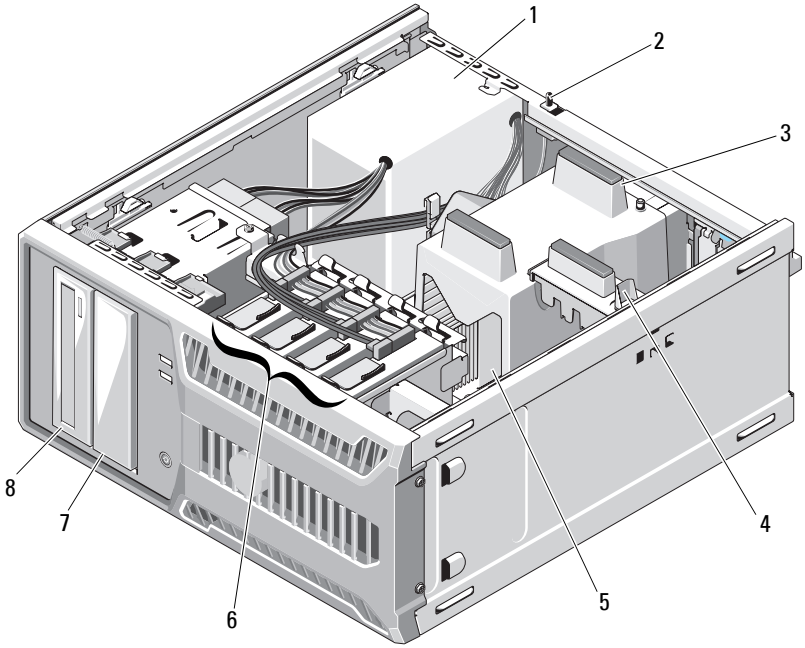
You may need the following items to perform the procedures in this section:

- Key to the system keylock
- #2 Phillips screwdriver
- Wrist grounding strap

Inside the System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Figure 3-1. Inside the System



1	power supply	2	chassis intrusion switch
3	cooling shroud	4	expansion card stabilizer
5	heat sink	6	hard drives (4)
7	tape drive (optional)	8	optical drive (optional)

Opening and Closing the System

WARNING: Whenever you need to lift the system, get others to assist you. To avoid injury, do not attempt to lift the system by yourself.

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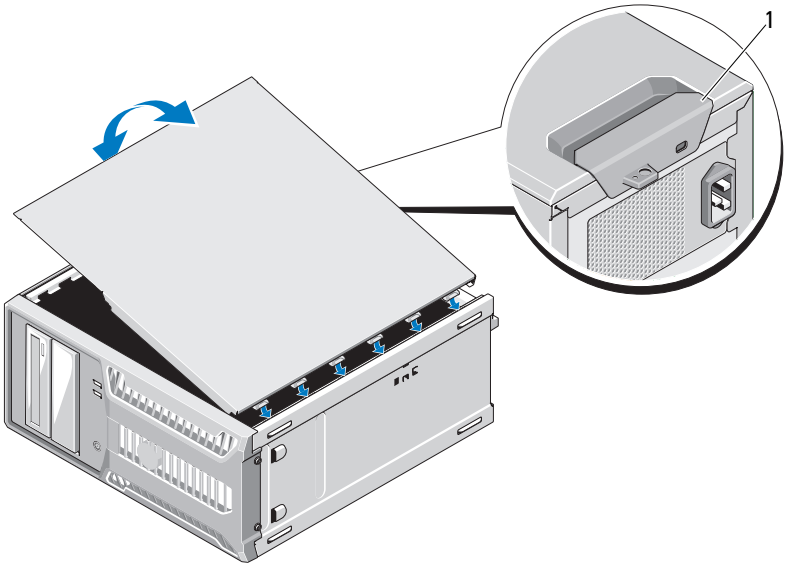
Opening the System

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Press the power button to ground the system board.
3. Lay the system on its side as shown in Figure 3-2.
4. Open the system by sliding the cover release tab toward the back of the system, grasp the cover on both sides, and carefully lift the cover away from the system. See Figure 3-2.

Figure 3-2. Opening and Closing the System



1 release tab

Closing the System

1. Align the cover with the slots on the bottom of the chassis. See Figure 3-2.
2. Press down on the cover until the cover release tab snaps into place.
3. Place the system upright on a flat, stable surface.
4. Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

Front Bezel

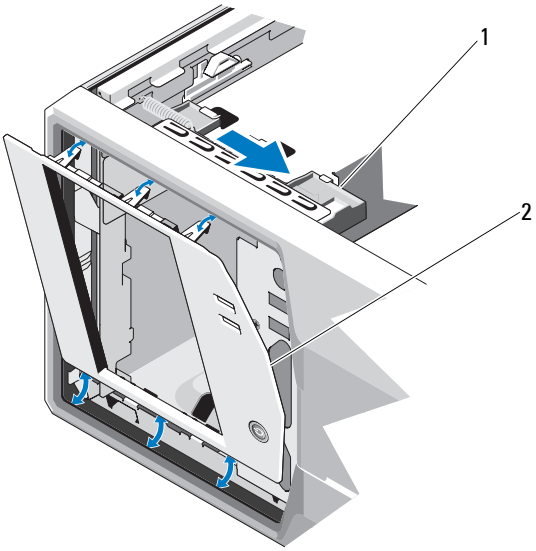
Removing the Front Bezel

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. Slide the drive release latch in the direction of the arrow until it releases the front bezel from its side hinges. See Figure 3-3.

   NOTE: The drive release latch secures and releases the front bezel and helps to secure the drives.
4. Carefully tilt the front bezel away from the chassis and lift it out as shown in Figure 3-3.
5. Close the system. See "Closing the System" on page 46.

Figure 3-3. Removing and Installing the Front Bezel



1 drive release latch 2 front bezel

Installing the Front Bezel

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the tabs on the front bezel with the slots on the chassis. See Figure 3-3.
2. Snap the bezel into place.

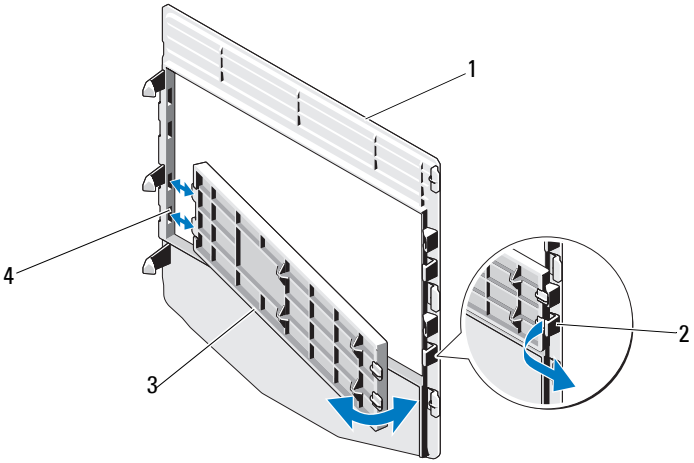
Removing Front-Bezel Insert

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: Before installing a drive in one or more of the front drive bays, remove the corresponding insert(s) on the front bezel.

1. From the back of the bezel, push the tab at the end of the insert outward.
2. Pull the insert away from the bezel. See Figure 3-4.

Figure 3-4. Removing and Installing the Front Bezel Insert



1	front bezel	2	insert tab
3	front bezel insert	4	notches

Installing Front-Bezel Insert

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. From the back of the bezel, fit the tabs on the end of the insert into the notches on the bezel.
2. Snap the other end of the insert into place. See Figure 3-4.

EMI Filler Panel

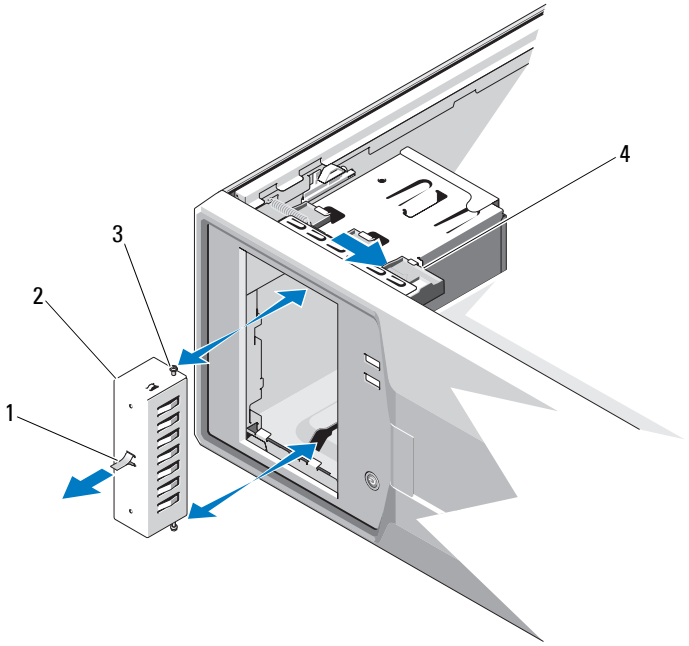
Depending on the configuration of your system, an electromagnetic interference (EMI) filler panel may be installed in one or more of the 5.25-inch optical drive bays at the front of the system. EMI filler panels are essential for airflow efficiency and for electromagnetic interference protection. Before installing an optical drive, the corresponding EMI filler panel must first be removed.

Removing an EMI Filler Panel

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. Remove the front bezel. See "Removing the Front Bezel" on page 47.
4. Slide the drive release latch in the direction of the arrow to release the shoulder screw and pull the tab to remove the EMI filler panel. See Figure 3-5.

Figure 3-5. Removing and Installing the EMI Filler Panel



1	tab	2	EMI filler panel
3	shoulder screws (2)	4	drive release latch

Installing an EMI Filler Panel

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the screws on the EMI filler panel with the slots in the chassis and slide the EMI filler panel into the bay until it clicks into place. See Figure 3-5.
2. Replace the front bezel. See "Installing the Front Bezel" on page 48.
3. Close the system. See "Closing the System" on page 46.

Optical and Tape Drives (Optional)

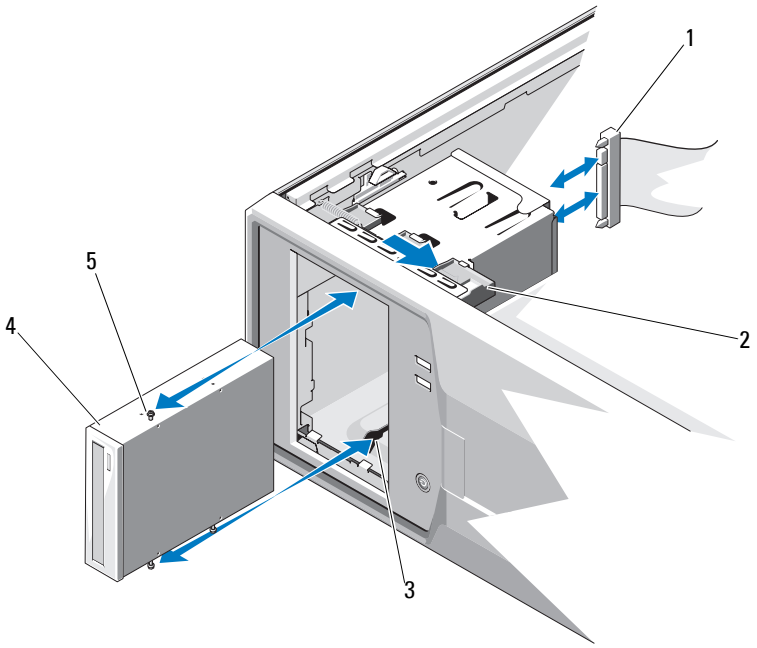
Your system contains two 5.25-inch drive bays. In the upper 5.25-inch drive bay, you can install only an optical drive. In the lower 5.25-inch drive bay, you can install either an optical or a tape backup unit.

Removing an Optical or Tape Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

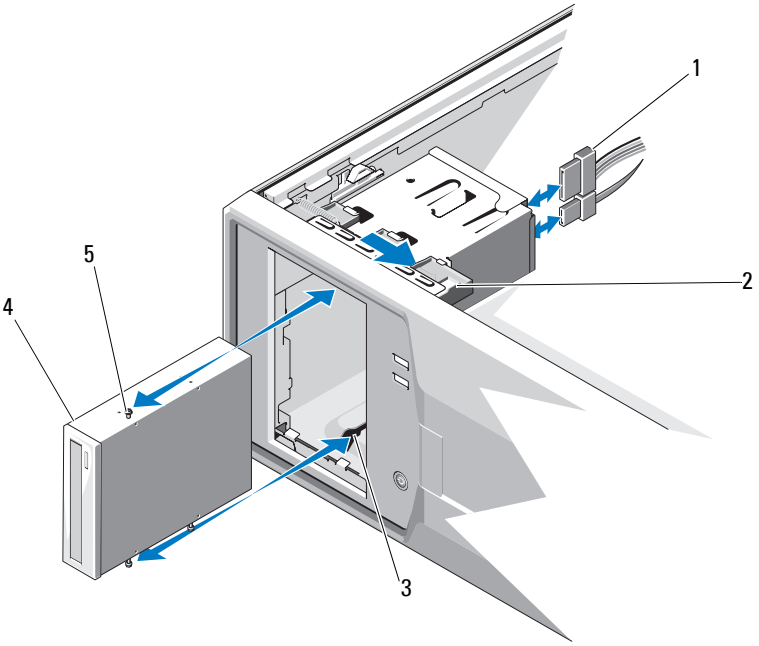
1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. Remove the front bezel. See "Removing the Front Bezel" on page 47.
4. Disconnect the power and data cables from the back of the drive. See Figure 3-6 for disconnecting a SAS connection and Figure 3-7 for disconnecting a SATA connection.
5. Slide the drive release latch in the direction of the arrow to release the shoulder screw and slide the drive out to remove it from the drive bay.

Figure 3-6. Removing and Installing a Tape Drive (SAS Connection)



1	power/data cable	2	drive release latch
3	drive bay screw slots	4	tape drive
5	tape drive shoulder screws (3)		

Figure 3-7. Removing and Installing an Optical Drive (SATA Connection)



1	power/data cable	2	drive release latch
3	drive bay screw slots	4	optical drive
5	optical drive shoulder screws (3)		

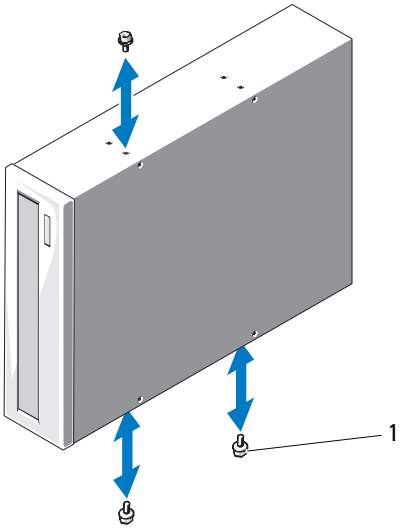
6. If you are installing another drive in the bay, see "Installing an Optical or Tape Drive" on page 55.
7. If the drive is being permanently removed, install an insert on the front bezel. See "Installing Front-Bezel Insert" on page 50.
8. Replace the front bezel. See "Installing the Front Bezel" on page 48.
9. Close the system. See "Closing the System" on page 46.

Installing an Optical or Tape Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Unpack the drive and prepare it for installation. For instructions, see the documentation that accompanied the drive.
2. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See "Opening the System" on page 45.
4. Remove the front bezel. See "Removing the Front Bezel" on page 47.
5. If another drive is installed, remove it (see "Removing an Optical or Tape Drive" on page 52) and remove the three shoulder screws to attach to the new drive. See Figure 3-8.
6. If the drive bay is empty, remove the insert on the front bezel. See "Removing Front-Bezel Insert" on page 49.
7. Remove the three shoulder screws from the EMI filler panel and attach them to the new drive. See Figure 3-8.

Figure 3-8. Installing Drive Shoulder Screws



1 shoulder screws (3)*

*Screws are supplied along with the drives ordered from Dell.

8. Gently slide the drive into the bay until it clicks into place.
9. Attach the SAS cable (tape drive) or SATA power cable (optical drive) to the drive. Ensure that cables are secured in their respective clips.
10. Attach the SATA data cable (optical drive).
11. Check all cable connections and fold cables out of the way to allow for airflow between the fan and cooling vents.
12. Replace the front bezel. See "Installing the Front Bezel" on page 48.
13. Close the system. See "Closing the System" on page 46.

Hard Drives

NOTE: The system's drive configuration must consist of either all SATA hard drives or all SAS hard drives. Mixed configurations are not supported.

Hard Drive Installation Guidelines

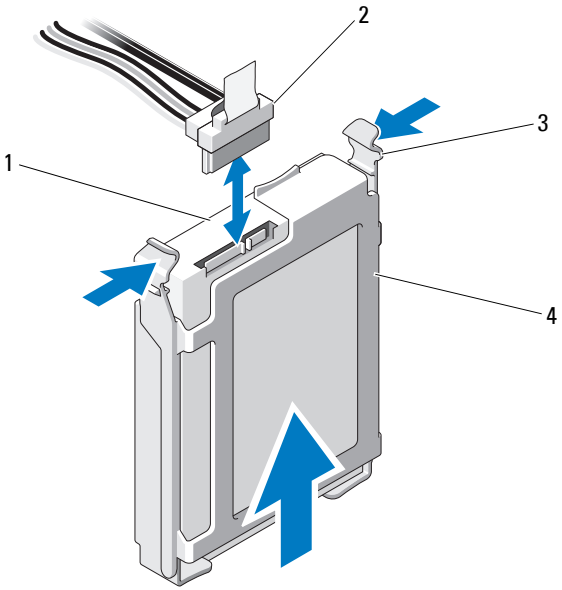
Your system supports up to four 3.5-inch or six 2.5-inch hard drives in internal drive bays.

Removing a 3.5-Inch Hard Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and from the peripherals.
2. Open the system. See "Opening the System" on page 45.
3. Disconnect the data/power cable from the hard drive by pulling the blue tab.
4. Press the blue tabs on each side of the hard-drive bracket toward each other and slide the drive up and out of the bay. See Figure 3-9.

Figure 3-9. Removing and Installing a 3.5-Inch Hard Drive



1	hard drive	2	power/data cable
3	tabs (2)	4	hard drive bracket

NOTE: If you are not replacing the hard drive, remove the drive from the drive bracket (see Figure 3-11) and insert the empty bracket back into the drive bay.

5 Detach the hard-drive bracket from the hard drive by pushing out at the edges of the bracket and removing the hard drive. See Figure 3-11.

6 Close the system. See "Closing the System" on page 46.

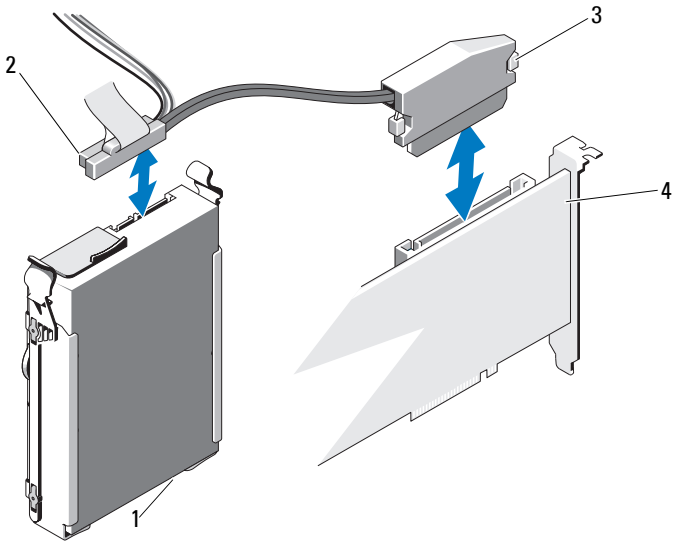
Installing a 3.5-Inch Hard Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. To remove the existing hard-drive bracket, press the blue tabs on each side of the bracket toward each other and slide the bracket up and out of the system. See Figure 3-9.
4. Snap the hard-drive bracket on to the hard drive. See Figure 3-11.
5. Slide the hard drive into the drive bay until it snaps into place.
6. Connect the power/data cable to the hard drive.
   - For connection to the integrated SATA controller (SATA hard drives only), connect the SATA data cable to the SATA connectors on the system board. See Figure 6-1 for the location of the hard drive connectors on the system board.
   - For connection to a SAS controller expansion card (SAS or SATA hard drives), connect the data/power cable from the SAS controller card as shown in Figure 3-10. See "SAS Controller Expansion Card" on page 72 for instructions about installing the card and routing the cables.

   NOTE: The SAS controller card must be installed in SLOT1 PCIE_G2_X8. See Figure 6-1.

Figure 3-10. Attaching a SAS Hard Drive to a SAS Controller Expansion Card



1	SAS hard drive	2	power/data cable
3	data cable	4	SAS controller card

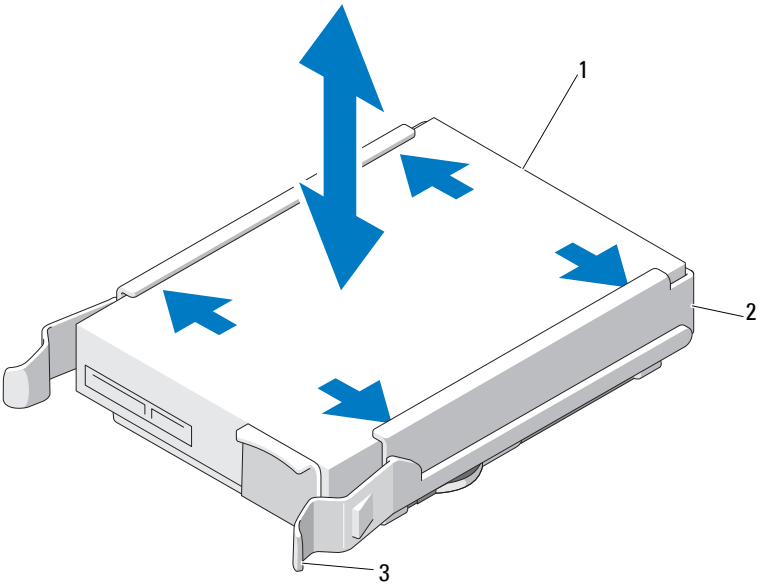
7. Close the system. See "Closing the System" on page 46.
8. Enter the System Setup program and ensure that the hard drive's controller is enabled. See "Entering the System Setup Program" on page 24.
9. Exit the System Setup program and reboot the system.
10. Partition and logically format the drive.

    See the documentation that came with the drive for instructions on installing any software required for drive operation.

Removing a 3.5-Inch Hard Drive From a Hard-Drive Bracket

Detach the hard-drive bracket from the hard drive by pushing out the edges of the bracket and removing the hard drive. See Figure 3-11.

Figure 3-11. Removing and Installing a Hard Drive From a Hard-Drive Bracket



1 hard drive
2 hard drive bracket
3 blue tabs (2)

Installing a 3.5-Inch Hard Drive Into a Hard-Drive Bracket

Push out the edges of the bracket and snap the hard-drive bracket on to the hard drive. See Figure 3-11.

Removing a 2.5-Inch Hard Drive (When Available)

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

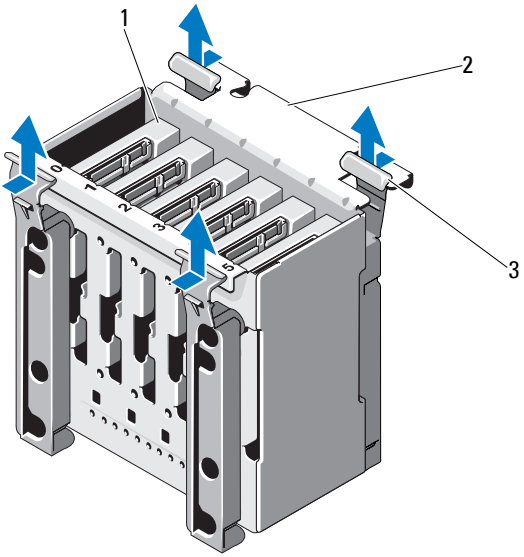
1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet and from the peripherals.

2 Open the system. See "Opening the System" on page 45.

3 Disconnect the data/power cable(s) from the hard drive(s) by pulling the blue tab.

4 Press the blue tabs on each side of the hard-drive carrier toward each other and slide the bracket up and out of the bay. See Figure 3-12.

Figure 3-12. Removing a 2.5-Inch Hard-Drive Carrier



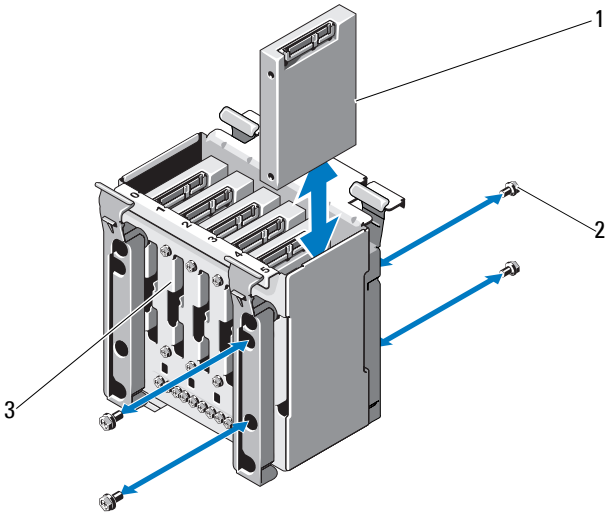
1 hard drive

2 hard-drive carrier

3 blue tabs (4)

5 Remove the four screws on the two sides of the hard-drive carrier and pull out the hard drive. See Figure 3-13.

Figure 3-13. Removing and Installing a 2.5-Inch Hard Drive



1	hard drive	2	screws (4)
3	hard-drive bracket		

6. Slide the hard-drive carrier back in the hard drive bay.
7. Connect the power/data cable(s) to the hard drive(s).
8. Close the system. See "Closing the System" on page 46.

Installing a 2.5-Inch Hard Drive (When Available)

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.

3 To remove the existing hard-drive carrier, see step 4 of "Removing a 2.5-Inch Hard Drive (When Available)" on page 61.

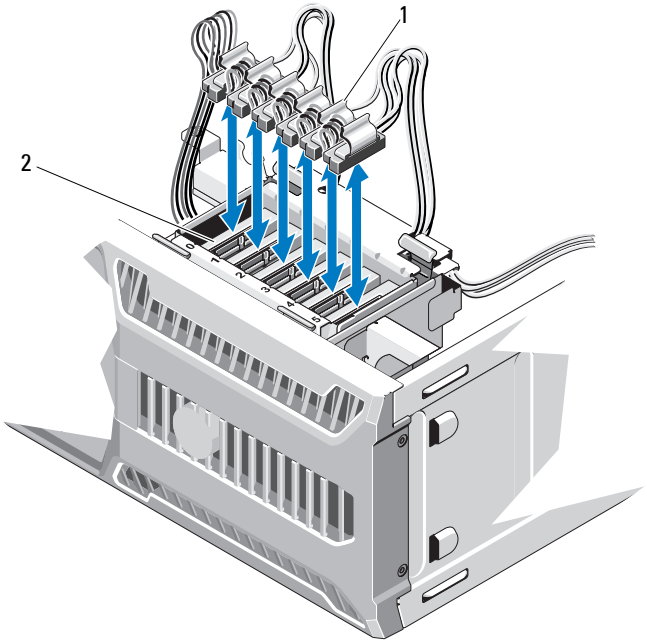
4 Secure the hard drive to the hard-drive carrier using the four screws. See Figure 3-13.

5 Slide the hard-drive carrier back in the hard drive bay.

6 Slide the hard drive into the drive bay until it snaps into place.

7 Connect the power/data cable to the hard drive. See Figure 3-14

Figure 3-14. Attaching Power/Data Cable to the Hard Drive



1 power/data cables 2 hard drives

8 Close the system. See "Closing the System" on page 46.

9 Enter the System Setup program and ensure that the hard drive's controller is enabled. See "Entering the System Setup Program" on page 24.

10 Exit the System Setup program and reboot the system.

11 Partition and logically format the drive.

See the documentation that came with the drive for instructions on installing any software required for drive operation.

Expansion-Card Stabilizer

Removing the Expansion-Card Stabilizer

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals. Disconnect the system from the electrical outlet and peripherals.

2 Open the system. See "Opening the System" on page 45.

3 Press the release tab and lift the expansion card stabilizer out of slots in the chassis. See Figure 3-15.

Installing the Expansion-Card Stabilizer

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Slide the edge of the expansion-card stabilizer into the slots in the cooling shroud and chassis until the release tab locks into place. See Figure 3-15.

2 Close the system. See "Closing the System" on page 46.

Cooling Shroud

The cooling shroud directs airflow over the system processor and memory modules.

WARNING: The memory modules and heat sink can get very hot during normal operation. Ensure that the memory modules and heat sink have had sufficient time to cool before you touch them.

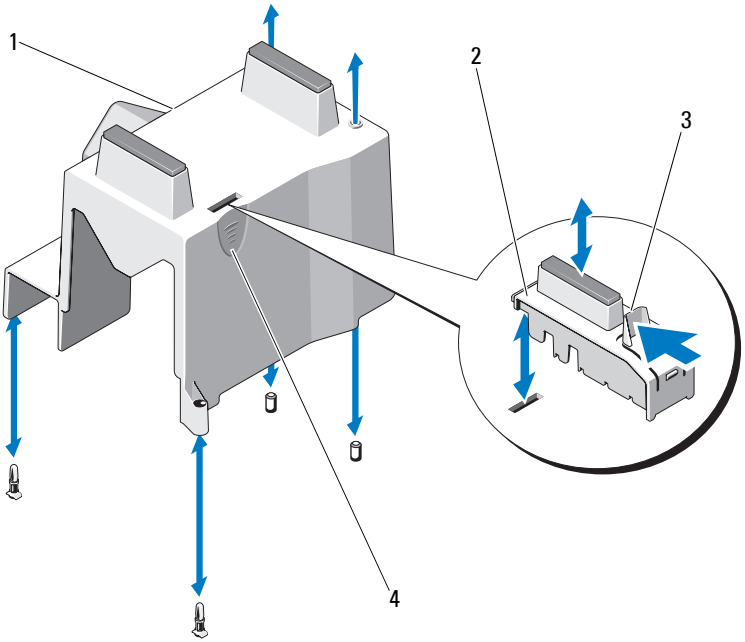
CAUTION: Never operate your system with the cooling shroud removed. Overheating of the system can develop quickly, resulting in shutdown of the system and loss of data.

Removing the Cooling Shroud

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals. Disconnect the system from the electrical outlet and peripherals.
2. Open the system. See "Opening the System" on page 45.
3. Remove the expansion-card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.
4. Hold the touch points on the cooling shroud and lift the cooling shroud out of the system. See Figure 3-15.

Figure 3-15. Removing and Installing the Cooling Shroud



1	cooling shroud	2	expansion-card stabilizer
3	release tab	4	cooling shroud touch points (2)

Installing the Cooling Shroud

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the holes on the cooling shroud with the alignment guides on the system fan.
2. Hold the touch points on the cooling shroud and carefully lower the cooling shroud into the system. Ensure that no cables are under the edges of the cooling shroud.

3 Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

4 Close the system. See "Closing the System" on page 46.

Expansion Cards

Expansion Card Installation Guidelines

Your system supports up to four PCIe Generation 2 cards. To identify the expansion slots, see Figure 6-1.

Observe the following notes and guidelines regarding the expansion-card slots:

- The expansion-card slots are not hot-swappable.
- PCI Express Generation 2 and Generation 1 expansion cards are supported in all slots.
- Slot 2 supports full-length expansion cards; slots 1, 3, and 4 support half-length expansion cards.
- The system supports up to two SAS or PERC expansion cards to manage external storage.

CAUTION: To ensure proper cooling, no more than two of the four expansion cards can have a power consumption of greater than 15 W (up to 25 W maximum each), not including the integrated storage controller card.

- Table 3-1 provides a guide for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All other expansion cards should be installed in card priority and slot priority order.

Table 3-1. Expansion-Card Installation Priority

Card Priority	Card Type	Slot Priority	Max Allowed	25-W Card
1	S300 controller	1	1	Y
2	H200 controller	1, 2	2	Y
3	6-Gbps SAS HBA	1, 2	2	Y
4	Dual port NICs	3, 1, 2	3[1]	N[2]
5	Single port NICs	4, 3, 1, 2	4	N[1]

1. Maximum of 2 of any card whose maximum power exceeds 15 W.
2. Refer to the expansion card documentation to ensure that the maximum power does not exceed 15 W.

NOTE: A system only allows one internal storage card to be installed, and the additional H200 plugged in slot2 is to support internal Tape Drive.

See Figure 6-1 for the location of the expansion card slots.

NOTE: Your system supports only one RAID card. You can install either of the above mentioned RAID cards in slot 1. The size of the expansion card connectors for the PCI x8 card is PCI x8.

Removing an Expansion Card

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. Remove the expansion card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.
4. Disconnect all cables from the card.
5. Open the expansion-card latch. See Figure 3-16.

6 Grasp the expansion card by its edges, and carefully remove it from the expansion-card connector.

7 If you are removing the card permanently, install a metal filler bracket over the empty expansion slot opening and close the expansion-card latch.

NOTE: Filler brackets must be installed over empty expansion card slots to maintain Federal Communications Commission (FCC) certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

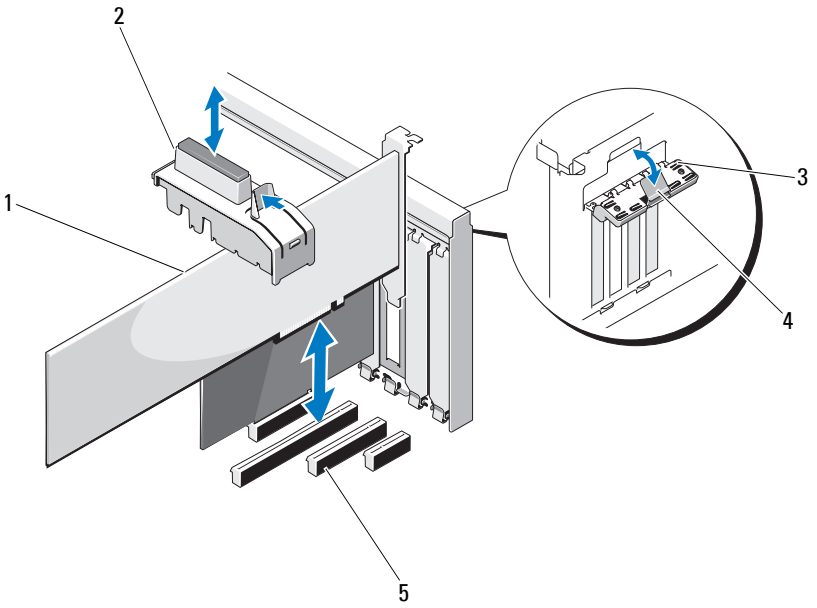
8 Replace the expansion card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

9 Close the system. See "Closing the System" on page 46.

10 Reconnect the system and peripherals to their power sources, and turn them on.

11 Remove the card's device driver from the operating system.

Figure 3-16. Removing and Installing an Expansion Card



1	expansion card	2	expansion-card stabilizer
3	expansion-card latch	4	release tab
5	expansion-card slots		

Installing an Expansion Card

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Unpack the expansion card and prepare it for installation.

   For instructions, see the documentation accompanying the card.

2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System" on page 45.

4 Remove the expansion card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.

5 Open the expansion-card latch and remove the filler bracket. See Figure 3-16.

NOTE: Keep this bracket in case you need to remove the expansion card. Filler brackets must be installed over empty expansion-card slots to maintain FCC certification of the system. The brackets also keep dust and dirt out of the system and aid in proper cooling and airflow inside the system.

6 Holding the card by its edges, position the card so that the card-edge connector aligns with the expansion-card connector on the expansion-card riser.

7 Insert the card-edge connector firmly into the expansion-card connector until the card is fully seated.

8 Close the expansion-card latch. See Figure 3-16.

9 Connect all cables to the expansion card.

10 Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

11 Close the system. See "Closing the System" on page 46.

SAS Controller Expansion Card

Read the installation instructions in the documentation for your SAS controller card. Install the card in the expansion card connector (see "Installing an Expansion Card" on page 71), and connect the hard-drive activity indicator cable from the card to the HD_ACT_CARD (AUXLED1) connector on the system board (see Figure 6-1 to locate the connector). Secure the cables to the slots to manage the slack.

For information on connecting hard drives, see "Hard Drives" on page 57.

System Memory

Your system supports DDR3 ECC unbuffered memory modules (UDIMMs). The DIMMs can be 1066 or 1333 MHz. Single and dual-rank DIMMs can be 1066 or 1333 MHz.

The system contains four memory sockets, each two-socket set is organized into two channels. The first socket of each channel is marked with white release levers.

General Memory Module Installation Guidelines

To ensure optimal performance of your system, observe the following general guidelines when configuring your system memory.

NOTE: Memory configurations that fail to observe these guidelines can prevent your system from starting or producing any video output.

- Except for memory channels that are unused, all populated memory channels must have identical configurations.
- Memory modules of different sizes can be mixed within a memory channel (for example, 2 GB and 4 GB), but all populated channels must have identical configurations.
- Memory modules are installed in the numeric order of the sockets beginning with DIMM_A1 or DIMM_B1.
- One or two DIMMs per channel can support up to 1333 MHz.
- If memory modules with different speeds are installed, they operate at the speed of the slowest installed memory module(s).

Mode-Specific Guidelines

Your system supports both single-channel and dual-channel mode. A minimal single-channel configuration of one 1 GB memory module is also supported in this mode.

Table 3-2 shows sample memory configurations that follow the appropriate memory guidelines stated in this section. The samples show identical memory-module configurations and their the physical and available memory totals. The table does not show mixed memory-module configurations, nor do they address the memory speed considerations of any configuration.

Table 3-2. Sample UDIMM Memory Configurations

Memory Module Size	Memory Sockets				Single Processor
	1	3	2	4	Physical Memory (GB)
1 GB	X				1
	X		X		2
	X	X	X	X	4
2 GB	X				2
	X		X		4
	X	X	X	X	8
4 GB	X				4
	X		X		8
	X	X	X	X	16
8 GB	X				8
	X		X		16
	X	X	X	X	32

Removing Memory Modules

WARNING: The memory modules are hot to touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

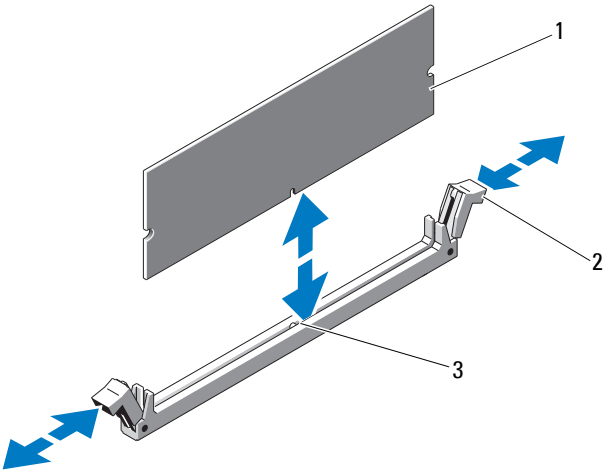
CAUTION: To ensure proper system cooling, memory-module blanks must be installed in any memory socket that is not occupied. Install a memory-module blank if you are removing a memory module and do not intend to install a replacement.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Open the system. See "Opening the System" on page 45.
3. Remove the expansion-card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.
4. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 66.
5. Locate the memory module sockets. See Figure 6-1.

CAUTION: Handle each memory module only by the card edges, ensuring not to touch the components on the module.

6. Press down and out on the ejectors on each end of the socket until the memory module pops out of the socket. See Figure 3-17.
7. Replace any removed memory modules with memory-module blanks to ensure proper system cooling. See "Installing Memory Modules" on page 76 for installation instructions.
8. Replace the cooling shroud. See "Installing the Cooling Shroud" on page 67.
9. Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.
10. Close the system. See "Closing the System" on page 46.

Figure 3-17. Removing and Installing a Memory Module



1 memory module
2 memory module socket ejectors (2)
3 alignment key

Installing Memory Modules

WARNING: The memory modules are hot to touch for some time after the system has been powered down. Allow time for the memory modules to cool before handling them. Handle the memory modules by the card edges and avoid touching the components on the memory module.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

CAUTION: To ensure proper system cooling, memory-module blanks must be installed in any memory socket that is not occupied. Remove memory-module blanks only if you intend to install memory in those sockets.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet and peripherals.
2. Open the system. See "Opening the System" on page 45.

3 Remove the expansion-card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.

4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 66.

5 Locate the memory module sockets. See Figure 6-1.

6 Remove the memory-module blanks from the sockets in which you plan to install memory modules.

7 Press out the ejectors on each end of the socket until the memory-module blank pops out of the socket. See Figure 3-17.

NOTE: Make sure to retain any removed memory-module blanks for future use.

8 Handle each memory module only on either card edge, ensuring not to touch the middle of the memory module.

9 Align the memory module's edge connector with the alignment key of the memory module socket, and insert the memory module in the socket.

NOTE: The memory module socket has an alignment key that allows you to install the memory module in the socket in only one way.

10 Press down on the memory module with your thumbs until the socket levers latch into a locked position.

When the memory module is properly seated in the socket, the levers on the memory module socket align with the levers on the other sockets that have memory modules installed.

11 Repeat step 6 through step 10 of this procedure to install the remaining memory modules. See Table 3-2.

12 Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

13 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 67.

14 Close the system. See "Closing the System" on page 46.

15 Reconnect the system and peripherals to their power sources, and turn them on.

16 Press <F2> to enter the System Setup program, and check the **System Memory** setting on the main System Setup screen.

The system should have already changed the value to reflect the newly installed memory.

17 If the value is incorrect, one or more of the memory modules may not be installed properly. Repeat step 6 through step 10 of this procedure, checking to ensure that the memory modules are firmly seated in their sockets.

18 Run the system memory test in the system diagnostics. See "Running the Embedded System Diagnostics" on page 116.

Processor

Removing the Processor

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Prior to upgrading your system, download the latest system BIOS version from **support.dell.com** and follow the instructions included in the compressed download file to install the update on your system.

2 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet. When disconnected from AC power, press and hold the power button for 3 seconds to fully drain the system of stored power prior to removing the cover.

NOTE: It is recommended that you always use a static mat and wrist grounding strap while working on components in the interior of the system.

3 Open the system. See "Opening the System" on page 45.

4 Remove the expansion card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.

5 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 66.

WARNING: The heat sink and processor are hot to touch for some time after the system has been powered down. Allow the heat sink and processor to cool before handling them.

CAUTION: Never remove the heat sink from a processor unless you intend to remove the processor. The heat sink is necessary to maintain proper thermal conditions.

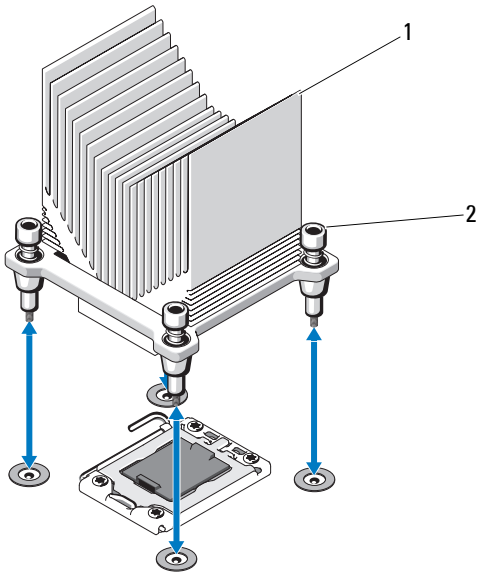
6 Using a #2 Phillips screwdriver, loosen one of the heat-sink retention screws. See Figure 3-18.

7 Wait 30 seconds for the heat sink to loosen from the processor.

8 Repeat step 6 and step 7 to loosen the other three heat-sink retention screws.

9 Gently lift the heat sink off of the processor and set the heat sink aside upside down (thermal grease side facing up).

Figure 3-18. Installing and Removing the Heat Sink



1 heat sink

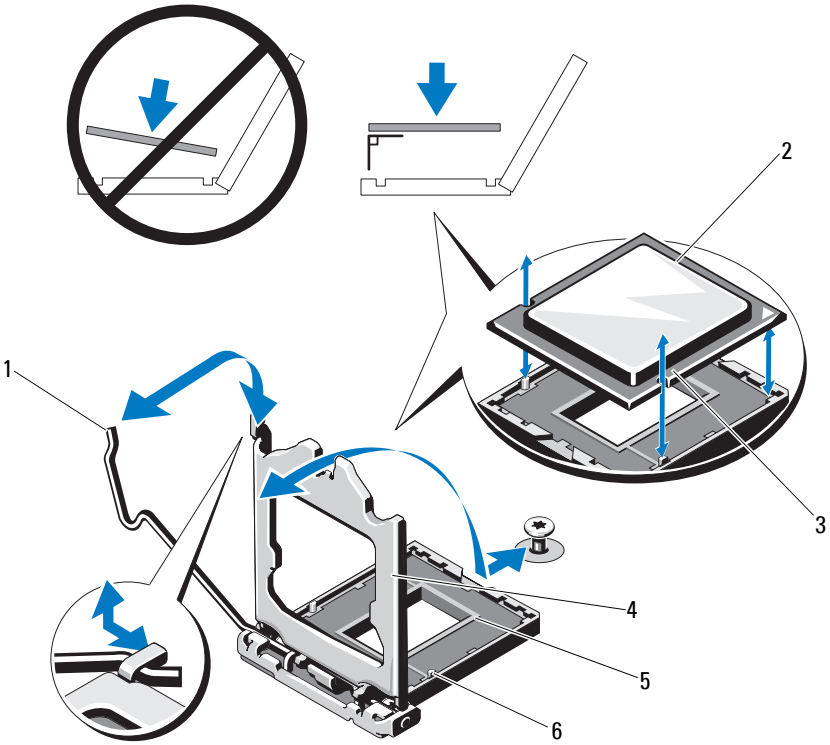
2 heat-sink retention screws (4)

CAUTION: The processor is held in its socket under strong pressure. Be aware that the release lever can spring up suddenly if not firmly grasped.

10 Position your thumb firmly over the processor socket-release lever and release the lever from the locked position by pushing down and pulling out from under the tab. Rotate the lever 90 degrees upward until the processor is released from the socket. See Figure 3-19.

11 Use the tab on the processor shield to rotate shield upward and out of the way. See Figure 3-19.

Figure 3-19. Removing a Processor



1	socket-release lever	2	processor
3	notches in processor (2)	4	processor shield
5	ZIF socket	6	socket keys (2)

CAUTION: Be careful not to bend any of the pins on the ZIF socket when removing the processor. Bending the pins can permanently damage the system board.

12 Carefully, lift the processor out of the socket and leave the release lever up so that the socket is ready for the new processor.

Installing a Processor

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Unpack the new processor.

2 Align the processor with the socket keys on the ZIF socket. See Figure 3-19.

CAUTION: Positioning the processor incorrectly can permanently damage the system board or the processor. Be careful not to bend the pins in the socket.

3 With the release lever on the processor socket in the open position, align the processor with the socket keys and set the processor lightly in the socket.

CAUTION: Do not use force to seat the processor. When the processor is positioned correctly, it engages easily into the socket.

4 Close the processor shield.

5 Rotate the socket release lever down until it snaps into place.

6 Using a clean lint-free cloth, remove the thermal grease from the heat sink.

7 Open the grease packet included with your processor kit and apply thermal grease evenly to the top of the new processor.

8 Place the heat sink on the processor. See Figure 3-19.

9 Using a #2 Phillips screwdriver, tighten the heat-sink retention screws. See Figure 3-18.

10 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 67.

11 Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

12 Close the system. See "Closing the System" on page 46.

13 Reconnect the system and peripherals to their power sources, and turn them on.

14 Press <F2> to enter the System Setup program, and check that the processor information matches the new system configuration. See "Entering the System Setup Program" on page 24.

15 Run the system diagnostics to verify that the new processor operates correctly. See "Running the Embedded System Diagnostics" on page 116 for information about running the diagnostics.

Cooling Fan

Removing the Cooling Fan

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 45.

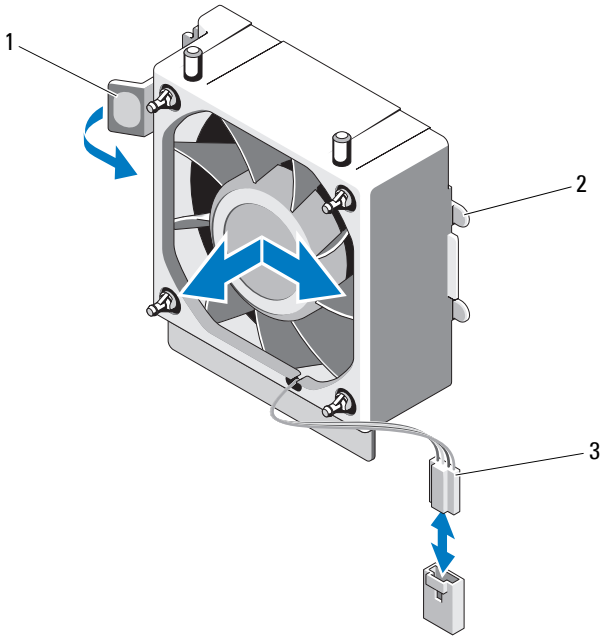
3 Remove the expansion-card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.

4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 66.

5 Disconnect the fan's power cable from the system board.

6 Pull the fan release tab and slide the fan out of the securing slots on the chassis, and lift the fan out.

Figure 3-20. Removing and Installing the Cooling Fan



1 release tab
2 securing tabs
3 power cable

Installing the Cooling Fan

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Align the tabs on the system fan with the securing slots on the chassis.
2. Slide the system fan into the securing slots until the tabs lock into place.
3. Connect the fan cable to the system board. See Figure 6-1 for the location of the connector.

4 Replace expansion card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

5 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 67.

6 Close the system. See "Closing the System" on page 46.

7 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

System Battery

Replacing the System Battery

WARNING: There is a danger of a new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. See your safety information for additional info.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

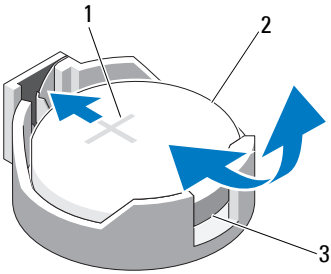
2 Open the system. See "Opening the System" on page 45.

3 Locate the battery socket. See Figure 6-1.

CAUTION: To avoid damage to the battery connector, you must firmly support the connector while installing or removing a battery.

4 To remove the system battery, push the metal tab away from the battery until the battery pops out.

Figure 3-21. Replacing the System Battery



1	positive side of battery connector	2	system battery
3	negative side of battery connector		

5. To install the new system battery, hold the battery with the "+" facing up, and aligned to the metal tab on the socket. Press the battery straight down into the socket until it snaps into place.
6. Close the system. See "Closing the System" on page 46.
7. Enter the System Setup program to confirm that the battery is operating properly. See "Using the System Setup Program and Boot Manager" on page 23.
8. Enter the correct time and date in the System Setup program's **Time** and **Date** fields.
9. Exit the System Setup program.

Power Supply

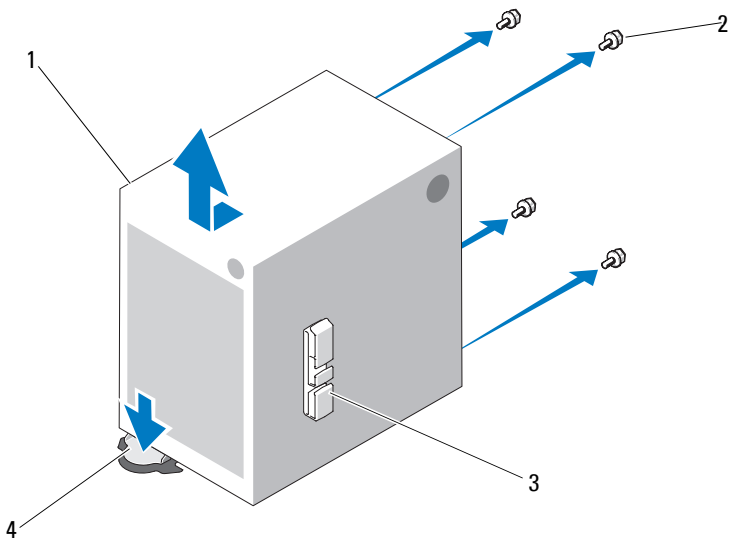
Removing the Power Supply

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. Remove the expansion-card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.
4. Remove the cooling shroud. See "Removing the Cooling Shroud" on page 66.
5. Disconnect all the power cables from the system board and drives.

   NOTE: Note the routing of the DC power cables underneath the tabs in the system frame as you release the tabs and remove the cables from the system board and drives. You must route these cables properly when you replace them to prevent their being pinched or crimped.
6. Remove the cables secured to the cable clip on the side of the power supply.
7. Using a #2 Phillips screwdriver, remove the four screws that secure the power supply to the back panel.
8. Press the power-supply release tab down and slide the power supply toward the front of the system.
9. Lift the power-supply out of the chassis. See Figure 3-22.
10. Remove the cable clip and set it aside to attach to the new power supply.

Figure 3-22. Removing and Installing the Power Supply



1	power supply	2	screws (4)
3	cable clip	4	power-supply release tab

Installing the Power Supply

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Attach the cable clip to the new power supply.
2. Align the power supply mounting holes with the mounting holes on the back panel.
3. Slide the power supply toward the back panel until it snaps into place over the power-supply release tab.
4. Using a #2 Phillips screwdriver, install the four screws that secure the power supply to the back panel.

5 Secure the I/O panel and SATA cables (if present) to the routing clip on the side of the power supply.

6 Connect all the power cables to the system board and drives.

7 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 67.

8 Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

9 Close the system. See "Closing the System" on page 46.

Internal USB Memory Key

An optional USB memory key installed inside your system can be used as a boot device, security key, or mass storage device.

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 45.

3 Locate the USB connector on the system board. See Figure 6-1.

4 Insert the USB memory key into the USB connector. See Figure 3-23.

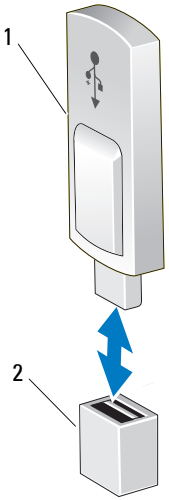
5 Close the system. See "Closing the System" on page 46.

6 Enter the System Setup program and verify that the USB key has been detected by the system. See"Using the System Setup Program and Boot Manager" on page 23.

The USB connector must be enabled by the **Internal USB Port** option in the **Integrated Devices** screen of the System Setup program. See "Integrated Devices Screen" on page 29.

To boot from the USB memory key, configure the USB memory key with a boot image and then specify the USB memory key in the boot sequence in the System Setup program.

Figure 3-23. Removing and Installing a USB Memory Key



1 USB memory key 2 USB memory key connector

Chassis Intrusion Switch

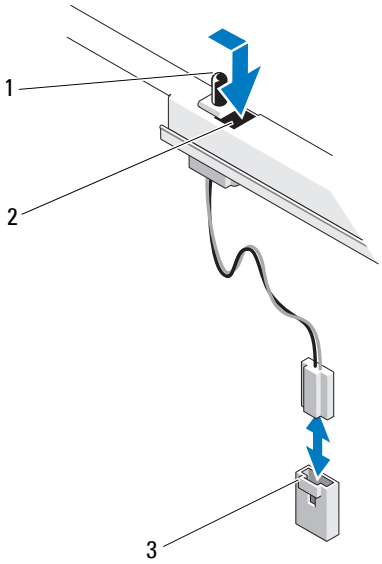
Removing the Chassis Intrusion Switch

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening the System" on page 45.
3. Disconnect the chassis intrusion switch cable from the INTRUSION connector on the system board. See Figure 6-1.
4. Slide the chassis intrusion switch out of the securing bracket notch. See Figure 3-24.

5 Remove the switch and its attached cable from the system.

Figure 3-24. Removing and Installing the Chassis Intrusion Switch



1 chassis intrusion switch
2 securing bracket notch
3 INTRUSION connector

Installing the Chassis Intrusion Switch

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Align the chassis intrusion switch with the securing bracket notch. See Figure 3-24.

2 Slide the switch into the securing bracket notch.

3 Connect the switch cable to the INTRUSION connector on the system board. See Figure 6-1.

4 Close the system. See "Closing the System" on page 46.

Control Panel Assembly

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Removing the Control Panel Assembly

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 45.

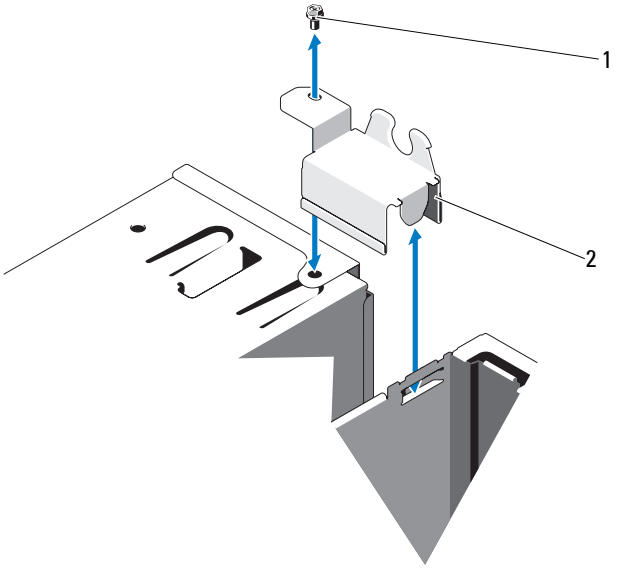
3 Remove the front bezel. See "Removing the Front Bezel" on page 47.

CAUTION: Do not pull on the cable to unseat the connector. Doing so can damage the cable.

4 To disconnect the control panel cable from the system board, press the metal tabs on the ends of the cable connector and gently work the connector out of the socket.

5 Remove the screw holding the link bracket lock and lift the link bracket lock out of the system.

Figure 3-25. Removing and Installing the Link Bracket Lock



1 screw 2 link bracket lock

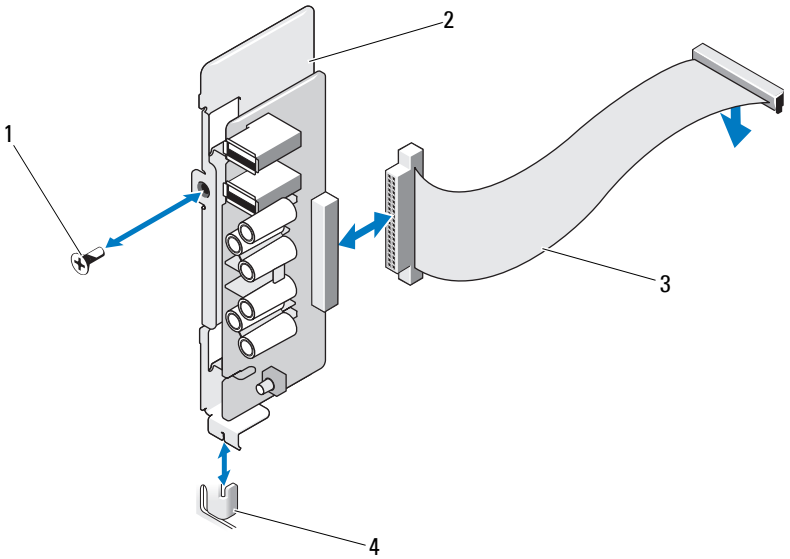
6 Remove the mounting screw holding the control panel assembly to the chassis. See Figure 3-26.

7 Move the control panel assembly toward the back of the system and lift it out of the system.

CAUTION: Do not pull on the cable to unseat the connector. Doing so can damage the cable.

8 To disconnect the control panel cable from the control panel assembly, press the metal tabs on the ends of the cable connector and gently work the connector out of the socket.

Figure 3-26. Removing and Installing the Control Panel Assembly



1	mounting screw	2	control-panel board
3	control-panel cable	4	standoff

Installing the Control Panel Assembly

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Connect the control panel cable to the control panel board.
2. Align the slot in the control panel board with the standoff on the chassis and secure it with the screw. See Figure 3-26.
3. Secure the link bracket lock by replacing the screw. See Figure 3-26.
4. Secure the control panel cable through the clips beneath the optional tape or optical drive and on the side of the power supply unit.

5 Connect the control-panel cable to the system board.

6 Replace the front bezel. See "Installing the Front Bezel" on page 48.

7 Close the system. See "Closing the System" on page 46.

8 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

System Board

Removing the System Board

WARNING: The heat sink can get hot during operation. To avoid burns, ensure that the system has sufficient time to cool before removing the system board.

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CAUTION: If you are using the Trusted Platform Module (TPM) with an encryption program, you may be prompted to create a recovery key during system or program setup. Be sure to create and safely store this recovery key. If you ever need to replace the system board, you must supply the recovery key when you restart your system or program before you can access the encrypted data on your hard drive(s).

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 45.

3 Remove expansion-card stabilizer. See "Removing the Expansion-Card Stabilizer" on page 65.

4 Remove the cooling shroud. See "Removing the Cooling Shroud" on page 66.

5 Disconnect all cables from the system board.

6 Remove the cooling fan. See "Removing the Cooling Fan" on page 82.

7 Remove all expansion cards and any attached cables. See "Removing an Expansion Card" on page 69.

8 Remove all memory modules. See "Removing Memory Modules" on page 75.

CAUTION: The processor and heat sink can become extremely hot. Allow sufficient time for the processor and heat sink to cool before handling.

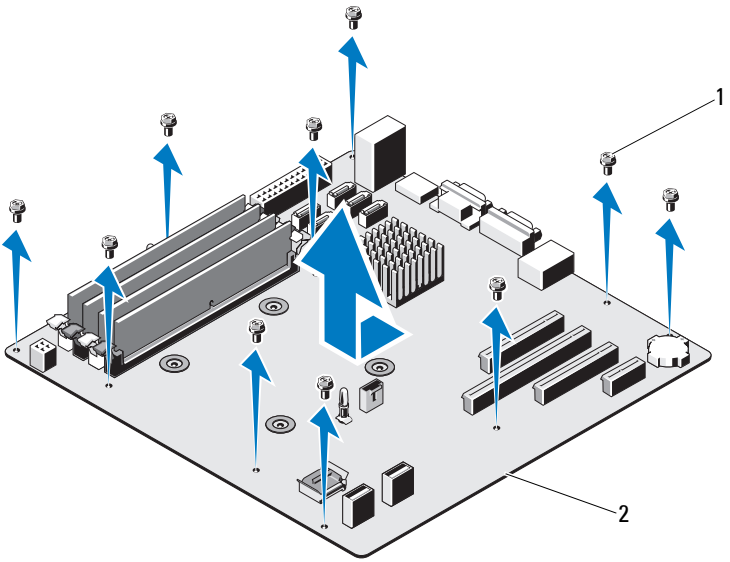
9 Remove the processor heat sink. See "Removing the Processor" on page 78.

10 Using a #2 Phillips screwdriver, remove the ten screws securing the system board to the chassis and then slide the system board toward the front end of the chassis.

CAUTION: Do not lift the system board by grasping a memory module, processor, or other components.

11 Grasp the system board by the edges of the system board and lift the system board out of the chassis. See Figure 3-27.

Figure 3-27. Removing and Installing the System Board



1 screws (10) 2 system board

Installing the System Board

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Unpack the new system board.
2. Remove the labels from the processor shield and affix them to the system identification panel on the front of the system. See Figure 3-27.
3. Holding the system board by its edges, lower the system board into the chassis.

CAUTION: Do not lift the system board by grasping a memory module, processor, or other components.

4. Slightly lift up the front of the system board and maneuver the system board to the bottom of the chassis until it lays completely flat.
5. Push the system board toward the back of the chassis until the board is in place.
6. Tighten the ten screws to secure the system board to the chassis. See Figure 6-1.
7. Transfer the processor to the new system board. See "Removing the Processor" on page 78 and "Installing a Processor" on page 81.
8. Replace all the memory modules and memory blanks. See "Installing Memory Modules" on page 76.
9. Connect the cables in the order listed below (see Figure 6-1 for the locations of the connectors on the system board):
   - SATA interface cable, if applicable
   - Control panel interface cable
   - Optical/tape drive power cable
   - System board power cables
10. Install all expansion cards. See "Installing an Expansion Card" on page 71.
11. Replace the cooling fan. See "Installing the Cooling Fan" on page 83.
12. Replace the heat sink. See "Installing a Processor" on page 81.

13 Replace the cooling shroud. See "Installing the Cooling Shroud" on page 67.

14 Replace the expansion-card stabilizer. See "Installing the Expansion-Card Stabilizer" on page 65.

15 Close the system. See "Closing the System" on page 46.

16 Reconnect the system to its electrical outlet and turn the system on, including any attached peripherals.

4

Troubleshooting Your System

Safety First—For You and Your System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Troubleshooting System Startup Failure

If your system halts during startup prior to video output, especially after installing an operating system or reconfiguring your system's hardware, check for the following conditions:

- If you boot the system to the BIOS boot mode after installing an operating system from the UEFI Boot Manager, the system hangs. The reverse is also true. You must boot to the same boot mode in which you installed the operating system. See "Using the System Setup Program and Boot Manager" on page 23.
- Invalid memory configurations could cause the system to halt at startup without any video output. See "System Memory" on page 73.

For all other startup issues, note the system messages that appear onscreen. See "System Messages" on page 17 for more information.

Troubleshooting External Connections

Ensure that all external cables are securely attached to the external connectors on your system before troubleshooting any external devices. See Figure 1-1 and Figure 1-2 for the front- and back-panel connectors on your system.

Troubleshooting the Video Subsystem

1. Check the system and power connections to the monitor.
2. Check the video interface cabling from the system to the monitor.
3. Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 115.

   If the tests run successfully, the problem is not related to video hardware.

   If the tests fail, see "Getting Help" on page 123.

Troubleshooting a USB Device

Use the following steps to troubleshoot a USB keyboard/mouse. For other USB devices, go to step 4.

1. Disconnect the keyboard and mouse cables from the system briefly and reconnect them.
2. Connect the keyboard/mouse to the USB port(s) on the opposite side of the system.
3. If the problem is resolved, restart the system, enter the System Setup program, and check if the nonfunctioning USB ports are enabled.
4. Replace the keyboard/mouse with another working keyboard/mouse.
5. If the problem is resolved, replace the faulty keyboard/mouse.
6. If the problem is not resolved, proceed to the next step to begin troubleshooting the other USB devices attached to the system.
7. Power down all attached USB devices and disconnect them from the system.
8. Restart the system and, if your keyboard is functioning, enter the system setup program. Verify that all USB ports are enabled. See "Integrated Devices Screen" on page 29.

   If your keyboard is not functioning, you can also use remote access. If the system is not accessible, see "Disabling a Forgotten Password" on page 122 for instructions on setting the NVRAM_CLR jumper inside your system and restoring the BIOS to the default settings.
9. Reconnect and power on each USB device one at a time.

10 If a device causes the same problem, power down the device, replace the USB cable, and power up the device.

If the problem persists, replace the device.

If all troubleshooting fails, see "Getting Help" on page 123.

Troubleshooting a Serial I/O Device

1 Turn off the system and any peripheral devices connected to the serial port.

2 Swap the serial interface cable with a working cable, and turn on the system and the serial device.

If the problem is resolved, replace the interface cable.

3 Turn off the system and the serial device, and swap the device with a comparable device.

4 Turn on the system and the serial device.

If the problem is resolved, replace the serial device.

If the problem persists, see "Getting Help" on page 123.

Troubleshooting a NIC

1 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 115.

2 Restart the system and check for any system messages pertaining to the NIC controller.

3 Check the appropriate indicator on the NIC connector:

- If the link indicator does not light, check all cable connections.
- If the activity indicator does not light, the network driver files might be damaged or missing.

  Remove and reinstall the drivers if applicable. See the NIC's documentation.

- If applicable, change the autonegotiation setting.
- Use another connector on the switch or hub.

  See "NIC Indicator Codes" on page 14.

4 Ensure that the appropriate drivers are installed and the protocols are bound. See the NIC's documentation.

5 Enter the System Setup program and confirm that the NIC ports are enabled. See "Integrated Devices Screen" on page 29.

6 Ensure that the NICs, hubs, and switches on the network are all set to the same data transmission speed and duplex. See the documentation for each network device.

7 Ensure that all network cables are of the proper type and do not exceed the maximum length.

If all troubleshooting fails, see "Getting Help" on page 123.

Troubleshooting a Wet System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 45.

3 Disassemble components from the system. See "Installing System Components" on page 43.

- Hard drives
- USB memory key
- Cooling shroud and expansion-card stabilizer
- Expansion cards
- Power supply
- Cooling fan
- Processor and heat sink
- Memory modules

4 Let the system dry thoroughly for at least 24 hours.

5 Reinstall the components you removed in step 3.

6 Close the system. See "Closing the System" on page 46.

7 Turn on the system and attached peripherals.

If the system does not start properly, see "Getting Help" on page 123.

8 If the system starts properly, shut down the system and reinstall all of the expansion cards that you removed. See "Installing an Expansion Card" on page 71.

9 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 115.

If the tests fail, see "Getting Help" on page 123.

Troubleshooting a Damaged System

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

2 Open the system. See "Opening the System" on page 45.

3 Ensure that the following components are properly installed:

- Cooling shroud and expansion-card stabilizer
- Expansion cards
- Power supply
- Cooling fan
- Processor and heat sink
- Memory modules
- Hard-drive carriers

4 Ensure that all cables are properly connected.

5 Close the system. See "Closing the System" on page 46.

6 Run the system board tests in the system diagnostics. See "Running the System Diagnostics" on page 115.

If the tests fail, see "Getting Help" on page 123.

Troubleshooting the System Battery

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: If the system is turned off for long periods of time (for weeks or months), the NVRAM may lose its system configuration information. This situation is caused by a defective battery.

1 Re-enter the time and date through the System Setup program. See "Using the System Setup Program and Boot Manager" on page 23.

2 Turn off the system and disconnect it from the electrical outlet for at least one hour.

3 Reconnect the system to the electrical outlet and turn on the system.

4 Enter the System Setup program.

If the date and time are not correct in the System Setup program, replace the battery. See "Replacing the System Battery" on page 84.

If the problem is not resolved by replacing the battery, see "Getting Help" on page 123.

NOTE: Some software may cause the system time to speed up or slow down. If the system seems to operate normally except for the time kept in the System Setup program, the problem may be caused by software rather than by a defective battery.

Troubleshooting Power Supply

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Reseat the power supply by removing and reinstalling it. See "Removing the Power Supply" on page 86 and "Installing the Power Supply" on page 87.

   NOTE: After installing a power supply, allow several seconds for the system to recognize the power supply and to determine if it is working properly.

   If the problem persists, replace the faulty power supply.

2. If the problem persists, see "Getting Help" on page 123.

Troubleshooting System Cooling Problems

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

Ensure that none of the following conditions exist:

- System cover, cooling shroud, EMI filler panel, memory-module blank, or back-filler bracket is removed.
- Ambient temperature is too high.
- External airflow is obstructed.
- The cooling fan is removed or has failed. See "Troubleshooting Cooling Fan" on page 106.
- The expansion card installation guidelines have not been followed. See "Expansion Card Installation Guidelines" on page 68.

Troubleshooting Cooling Fan

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Turn off the system and all attached peripherals.
2. Open the system. See "Opening the System" on page 45.
3. Reseat the fan's power cable.
4. Turn on the system.

   If the fan functions properly, close the system. See "Closing the System" on page 46.
5. If the fan does not function, turn off the system and install a new fan. See "Installing the Cooling Fan" on page 83.
6. Close the system. See "Closing the System" on page 46.
7. Turn on the system.

   If the problem is resolved, close the system. See "Closing the System" on page 46.

   If the replacement fan does not operate, see "Getting Help" on page 123.

Troubleshooting System Memory

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: Invalid memory configurations can cause your system to halt at startup without video output. See "General Memory Module Installation Guidelines" on page 73 and verify that your memory configuration complies with all applicable guidelines.

1. If the system is operational, run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 115.

   If diagnostics indicates a fault, follow the corrective actions provided by the diagnostic program.

2. If the system is not operational, turn off the system and attached peripherals, and unplug the system from the power source. Wait at least 10 seconds and then reconnect the system to power.
3. Turn on the system and attached peripherals and note the messages on the screen.

   Go to step 12 if an error message appears indicating a fault with a specific memory module.

4. Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 27. Make any changes to the memory settings, if needed.

   If the memory settings match the installed memory but a problem is still indicated, go to step 12.

5. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
6. Open the system. See "Opening the System" on page 45.
7. Check the memory channels and ensure that they are populated correctly. See "General Memory Module Installation Guidelines" on page 73.
8. Reseat the memory modules in their sockets. See "Installing Memory Modules" on page 76.

9 Close the system. See "Closing the System" on page 46.

10 Enter the System Setup program and check the system memory setting. See "Memory Settings Screen" on page 27.

If the problem is not resolved, proceed with the next step.

11 Open the system. See "Opening the System" on page 45.

12 If a diagnostic test or error message indicates a specific memory module as faulty, swap or replace the module.

13 To troubleshoot an unspecified faulty memory module, replace the memory module in the first DIMM socket with a module of the same type and capacity. See "Installing Memory Modules" on page 76.

14 Close the system. See "Closing the System" on page 46.

15 As the system boots, observe any error message that appears and the diagnostic indicators on the front of the system.

16 If the memory problem is still indicated, repeat step 12 through step 15 for each memory module installed.

If the problem persists after all memory modules have been checked, see "Getting Help" on page 123.

Troubleshooting an Internal USB Key

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Enter the System Setup program and ensure that the USB key port is enabled. See "Integrated Devices Screen" on page 29.

2 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

3 Open the system. See "Opening the System" on page 45.

4 Locate the USB key and reseat it.

5 Close the system. See "Closing the System" on page 46.

6 Turn on the system and attached peripherals and check if the USB key is functioning.

7 If the problem is not resolved, repeat step 2 and step 3.

8 Insert a different USB key that you know works properly.

9 Close the system. See "Closing the System" on page 46.

If the problem is not resolved, see "Getting Help" on page 123.

Troubleshooting an Optical Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1 Try using a different CD or DVD.

2 Enter the System Setup program and ensure that the integrated SATA controller and the drive's SATA port are enabled. See "Using the System Setup Program and Boot Manager" on page 23.

3 Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 115.

4 Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.

5 Open the system. See "Opening the System" on page 45.

6 Remove the front bezel. See "Removing the Front Bezel" on page 47.

7 Ensure that the interface cable is securely connected to the optical drive and to the controller.

8 Ensure that a power cable is properly connected to the drive.

9 Close the system. See "Closing the System" on page 46.

If the problem is not resolved, see "Getting Help" on page 123.

Troubleshooting a Tape Backup Unit

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Try using a different tape cartridge.
2. Ensure that the device drivers for the tape backup unit are installed and are configured correctly. See your tape drive documentation for more information about device drivers.
3. Reinstall the tape-backup software as instructed in the tape-backup software documentation.
4. For external tape drives, ensure that the tape drive's interface cable is fully connected to the external port on the controller card. For internal tape drives, check the cable connections:
   a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
   b. Open the system. See "Opening the System" on page 45.
   c. Reseat the controller card in the expansion card slot.
   d. Ensure that the tape drive's interface cable is fully connected to the tape drive and to the connector on the controller card (SAS).
   e. Ensure that a power cable is properly connected to the drive and to the system board.
   f. Close the system. See "Closing the System" on page 46.
5. Run the appropriate online diagnostics tests. See "Using Online Diagnostics" on page 115.

   If you cannot resolve the problem, see "Getting Help" on page 123.

Troubleshooting a Hard Drive

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

CAUTION: This troubleshooting procedure can destroy data stored on the hard drive. Before you proceed, back up all files on the hard drive.

1. Run the appropriate online diagnostics test. See "Using Online Diagnostics" on page 115.

   Depending on the results of the diagnostics test, proceed as needed through the following steps.

2. If your system has a RAID controller and your hard drives are configured in a RAID array, perform the following steps:

   a. Restart the system and enter the host adapter configuration utility program by pressing <Ctrl><R> for a PERC controller or <Ctrl><C> for a SAS controller.

      See the documentation supplied with the host adapter for information about the configuration utility.

   b. Ensure that the hard drive(s) have been configured correctly for the RAID array.

   c. Take the hard drive offline and reseat the drive.

   d. Exit the configuration utility and allow the system to boot to the operating system.

3. Ensure that the required device drivers for your controller card are installed and are configured correctly. See the operating system documentation for more information.

4. Restart the system, enter the System Setup program, and verify that the controller is enabled and the drives appear in the System Setup program. See "Using the System Setup Program and Boot Manager" on page 23.

   If the problem persists, see "Troubleshooting Expansion Cards" on page 112.

Troubleshooting Expansion Cards

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

NOTE: When troubleshooting an expansion card, see the documentation for your operating system and the expansion card.

1. Run the appropriate online diagnostic test. See "Using Online Diagnostics" on page 115.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See "Opening the System" on page 45.
4. Ensure that each expansion card is firmly seated in its connector. See "Installing an Expansion Card" on page 71.
5. Close the system. See "Closing the System" on page 46.
6. If the problem is not resolved, turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
7. Open the system. See "Opening the System" on page 45.
8. Remove all expansion cards installed in the system. See "Removing an Expansion Card" on page 69.
9. Close the system. See "Closing the System" on page 46.
10. Run the appropriate online diagnostic test.

    If the tests fail, see "Getting Help" on page 123.
11. For each expansion card you removed in step 8, perform the following steps:
    a. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
    b. Open the system. See "Opening the System" on page 45.
    c. Reinstall one of the expansion cards.
    d. Close the system. See "Closing the System" on page 46.

e Run the appropriate diagnostic test.

If the tests fail, see "Getting Help" on page 123.

Troubleshooting the Processor

CAUTION: Many repairs may only be done by a certified service technician. You should only perform troubleshooting and simple repairs as authorized in your product documentation, or as directed by the online or telephone service and support team. Damage due to servicing that is not authorized by Dell is not covered by your warranty. Read and follow the safety instructions that came with the product.

1. Run the appropriate online diagnostics test. See "Using Online Diagnostics" on page 115.
2. Turn off the system and attached peripherals, and disconnect the system from the electrical outlet.
3. Open the system. See "Opening the System" on page 45.
4. Ensure that the processor and heat sink are properly installed. See "Installing a Processor" on page 81.
5. Close the system. See "Closing the System" on page 46.
6. Run the appropriate online diagnostic test.

   If a problem is still indicated, see "Getting Help" on page 123.

5

Running the System Diagnostics

If you experience a problem with your system, run the diagnostics before calling for technical assistance. The purpose of the diagnostics is to test your system's hardware without requiring additional equipment or risking data loss. If you are unable to fix the problem yourself, service and support personnel can use diagnostics test results to help you solve the problem.

Using Online Diagnostics

To assess a system problem, first use the Online Diagnostics. Online Diagnostics is a suite of diagnostic programs, or test modules, that include diagnostic tests on chassis and storage components such as hard drives, physical memory, communications and printer ports, NICs, CMOS, and more. If you are unable to identify the problem using the online diagnostics, then use the embedded system diagnostics.

The files required to run the online diagnostics for systems running supported Microsoft Windows and Linux operating systems are available at **support.dell.com** and on the media that came with your system. For information about using diagnostics, see the *Dell Online Diagnostics User's Guide*.

Embedded System Diagnostics Features

The system diagnostics provides a series of menus and options for particular device groups or devices. The system diagnostics menus and options allow you to:

- Run tests individually or collectively
- Control the sequence of tests
- Repeat tests
- Display, print, or save test results
- Temporarily suspend testing if an error is detected or terminate testing when a user-defined error limit is reached
- View help messages that briefly describe each test and its parameters

- View status messages that inform you if tests are completed successfully
- View error messages that inform you of problems encountered during testing

When to Use the Embedded System Diagnostics

If a major component or device in the system does not operate properly, component failure may be indicated. As long as the processor and the system's input/output devices are functioning, you can use the embedded system diagnostics to help identify the problem.

Running the Embedded System Diagnostics

The embedded system diagnostics program is run from the Dell USC screen.

CAUTION: Use the embedded system diagnostics to test only your system. Using this program with other systems may cause invalid results or error messages.

1. As the system boots, press <F10>.
2. Click **Diagnostics** in the left pane and click **Launch Diagnostics** in the right pane.

The **Diagnostics** menu allows you to run all or specific diagnostics tests or to exit.

System Diagnostics Testing Options

Click the testing option in the **Main Menu** window.

Testing Option	Function
Express Test	Performs a quick check of the system. This option runs device tests that do not require user interaction.
Extended Test	Performs a more thorough check of the system. This test can take an hour or longer.
Custom Test	Tests a particular device.
Information	Displays test results.

Using the Custom Test Options

When you select **Custom Test** in the **Main Menu** window, the **Customize** window allows you to select the device(s) to be tested, select specific options for testing, and view the test results.

Selecting Devices for Testing

The left side of the **Customize** window lists devices that can be tested. Click (+) next to a device or module to view its components. Click (+) on any component to view the tests that are available. Clicking a device, rather than its components, selects all of the components of the device for testing.

NOTE: After you select all the devices and components that you want to test, highlight **All Devices** and then click **Run Tests**.

Selecting Diagnostics Options

From the **Diagnostics Options** area, select the test(s) you want to run on a device. You can select:

- **Non-Interactive Tests Only**—Runs only tests that require no user intervention.
- **Quick Tests Only**—Runs only the quick tests on the device.
- **Show Ending Timestamp**—Time stamps the test log.
- **Test Iterations**—Selects the number of times the test is run.
- **Log output file pathname**—Enables you to specify the USB memory key where the test log file is saved. You cannot save the file to a hard drive.

Viewing Information and Results

The following tabs in the **Customize** window provide information about the test and the test results:

- **Results**—Displays the test that ran and the result.
- **Errors**—Displays any errors that occurred during the test.
- **Help**—Displays information about the currently selected device, component, or test.
- **Configuration**—Displays basic configuration information about the currently selected device.
- **Parameters**—Displays parameters that you can set for the test.

6

Jumpers and Connectors

System Board Jumper

For information on resetting the password jumper to disable a password, see "Disabling a Forgotten Password" on page 122.

Table 6-1. System Board Jumper Settings

Jumper	Setting	Description
PWRD_EN	(default)	The password feature is enabled (pins 2–4)
		The password feature is disabled (pins 4–6)
NVRAM_CLR	(default)	The configuration settings are retained at system boot (pins 3–5)
		The configuration settings are cleared at the next system boot (pins 1–3)

System Board Connectors

Figure 6-1. System Board Jumpers and Connectors

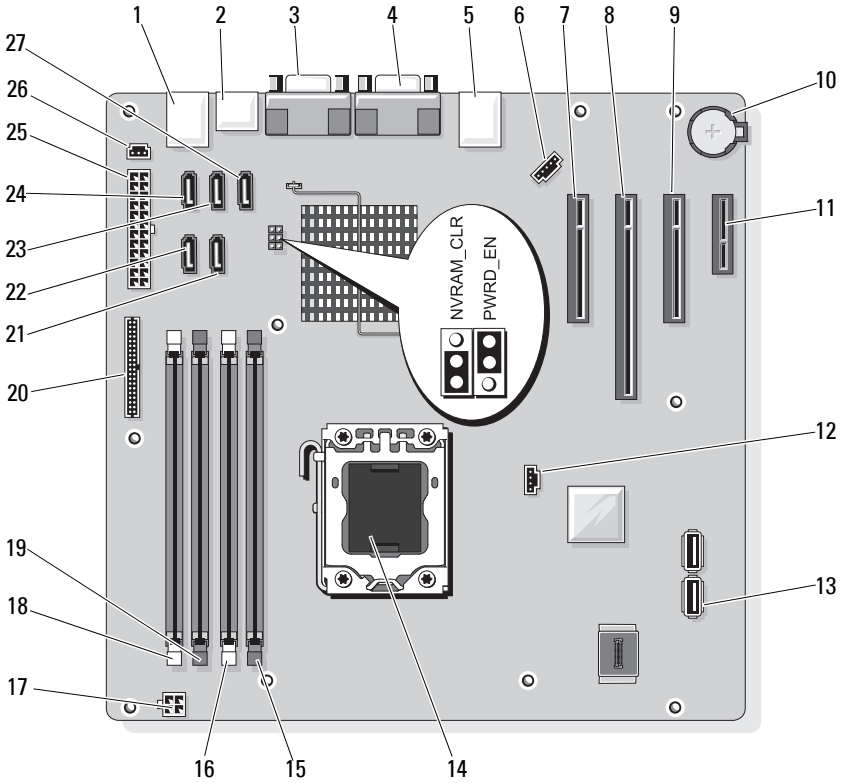


Table 6-2. System Board Jumpers and Connectors

Item	Connector	Description
1	USB	USB connectors (4)
2	SATA_F eSATA	eSATA connector
3	COM	Serial connector
4	VGA	Video connector

Table 6-2. System Board Jumpers and Connectors

Item	Connector	Description
5	NIC	NIC connector
6	FAN	System fan connector
7	SLOT1 PCIE_G2_X8	PCIe x8 half length
8	SLOT2 PCIE_G2_X8	PCIe x8 full length
9	SLOT3 PCIE_G2_X4	PCIe x4 half length
10	BATTERY	Battery socket
11	SLOT4 PCIE_G2_X1	PCIe x1 half length
12	HD_ACT_CARD	Auxiliary hard-drive LED
13	INT_USB1 and INT_USB2	Internal USB key 1 and 2
14	CPU	Processor
15	DIMM_A2	DIMM_A2 memory module slot
16	DIMM_A1	DIMM_A1 memory module slot
17	POWER12V	Power connector 12 V
18	DIMM_B1	DIMM_B1 memory module slot
19	DIMM_B2	DIMM_B2 memory module slot
20	CTRL_PNL	Control panel connector
21	SATA_B	SATA connector
22	SATA_A	SATA connector
23	SATA_C	SATA connector
24	SATA_D	SATA connector
25	PWR_CONN	Power connector
26	INTRUSION	Intrusion switch connector
27	SATA_E ODD	SATA connector

Disabling a Forgotten Password

The system's software security features include a system password and a setup password, which are discussed in detail in "Using the System Setup Program and Boot Manager" on page 23. The password jumper enables these password features or disables them and clears any password(s) currently in use.

CAUTION: See "Protecting Against Electrostatic Discharge" in the safety instructions that came with the system.

1. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
2. Open the system. See "Opening and Closing the System" on page 45.
3. Remove the jumper plug from the password jumper.

   See Figure 6-1 to locate the password jumper (labeled "PWRD_EN") on the system board.
4. Close the system. See "Closing the System" on page 46.

   The existing passwords are not disabled (erased) until the system boots with the password jumper plug removed. However, before you assign a new system and/or setup password, you must install the jumper plug.

   NOTE: If you assign a new system and/or setup password with the jumper plug still removed, the system disables the new password(s) the next time it boots.
5. Turn off the system, including any attached peripherals, and disconnect the system from the electrical outlet.
6. Open the system. See "Opening and Closing the System" on page 45.
7. Install the jumper plug on the password jumper.
8. Close the system. See "Closing the System" on page 46.
9. Assign a new system and/or setup password.

   To assign a new password using the System Setup program, see "Assigning a System Password" on page 38.

7

Getting Help

Contacting Dell

For customers in the United States, call 800-WWW-DELL (800-999-3355).

NOTE: If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Visit **support.dell.com**.
2. Click your country/region at the bottom of the page. For a full listing of country/region click **All**.
3. Click **All Support** from **Support** menu.
4. Select the appropriate service or support link based on your need.
5. Choose the method of contacting Dell that is convenient for you.

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